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ENTOMOLOGICAL & NATURAL HISTORY

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Hon. Editor.

PLATE I.



1



4



2



5



3



6

ABERRATIONS OF EUROPEAN BUTTERFLIES.

- | | |
|-------------------------------|---------------------------------|
| 1. <i>Polyommatus hylas</i> . | 4. <i>Polyommatus escheri</i> . |
| 2. <i>Melitæa didyma</i> . | 5. <i>Melitæa dictynna</i> . |
| 3. <i>Brenthis pales</i> . | 6. <i>Epinephele jurtina</i> . |

THE SOUTH LONDON Entomological & Natural History Society

(Established 1872)

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The Society has for its object the diffusion of Biological Science, by means of Papers and Discussions, and the formation of Typical Collections. There is a Library for the use of Members. Meetings of the Members are held on the 2nd and 4th Thursday evenings in each month, from Eight to Ten p.m., at the above address. The Society's Rooms are easy of access from all parts of London, and the Council cordially invites the co-operation of all Naturalists, especially those who are willing to further the objects of the Society by reading Papers and exhibiting Specimens.

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—*—

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l, orn.
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 Lewisham, S.E., and Hodeslea, Meads, Eastbourne. *l.*
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 Kent. *c, l.*
- 1895 ASHDOWN, W. J., Belmont Road, Leatherhead. *l, c, he.*
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 folk. *l.*
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 ham, Kent. *l.*
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l, c.
- 1911 BUXTON, PATRICK A., F.E.S., Fairhill, Tonbridge, Kent. *l.*
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- 1910 CARDEW, Major P. A., East Hill House, Queenstown, Co.
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head, Surrey. *l.*
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- 1899 CARR, Rev. F. M. B., M.A., L.Th., 186, High Road, Leyton,
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- 1897 CHAPMAN, T. A., M.D., F.E.S., F.Z.S., Betula, Reigate, Surrey. *l.*
- 1896 CLARK, F. N., 761, Garratt Lane, Tooting, S.W. *mi.*
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- 1907 COOTE, F. D., 25, Pendle Road, Streatham, S.W. *l, b.*
- 1909 COULSEN, F. J., 17, Birdhurst Road, Colliers Wood, Merton. *l.*
- 1902 COWHAM, F. W., 118, Minard Road, Hither Green, S.E. *l.*
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- 1898 CROW, E. J., 26, Tindal Street, North Brixton. *l.*
- 1910 CURWEN, B. S., 17, King Edward's Grove, Teddington. *l.*
- 1888 DAWSON, W. G., F.E.S., The Manor House, Upper Wick,
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- 1900 DAY, F. H., F.E.S., 26, Currock Terrace, Carlisle. *l, c.*
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- 1889 DENNIS, A. W., 56, Romney Buildings, Millbank, S.W. *l, mi, b.*
- 1901 DODS, A. W., *Hon. Librarian*, 88, Alkham Road, Stamford Hill. *l.*
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- 1915 FAGG, T. A., 55, Mt. Pleasant Road, Lewisham, S.E. *l.*
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- 1907 FOUNTAINE, Miss M. E., F.E.S., 1, Myola via Cairns, N. Queensland, Australia. *l.*
- 1912 FREEMAN, C. N., 54-5, Coleman Street, E.C. *l.*
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- 1912 FROHAWK, F. W., M.B.O.U., F.E.S., Stanley House, Park Road, Wallington, Surrey. *l, orn.*
- 1915 FRYER, GORDON, L. D. S., 52, London Road, Twickenham. *l.*
- 1914 FRYER, J. C. F., Craven House, Northumberland Av., S.W. *l.*
- 1911 GAHAN, C. J., M.A., F.E.S., British Museum (Natural History), South Kensington. *c.*
- 1912 GARDNER, J. E., 204, Evering Road, Upper Clapton, N.E.
- 1884 GIBB, L., F.E.S. The Shrubby, 33, Blackheath Park, S.E. (*Life member.*) *l.*
- 1909 GIBBS, A. E., F.L.S., F.Z.S., F.E.S., *Vice-president*, Houndspath, Upper Marlborough Road, St. Albans, Herts. (*Life member.*) *l.*
- 1913 GIBBS, Mrs. A. E., Houndspath, Upper Marlborough Road, St. Albans, Herts.
- 1908 GOFFE, E. R., 160, Ramsey Drive, Westcliff-on-Sea, Essex. *l.*

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- 1908 GREEN, E. D., 17, Manor Park, Lee, S.E. *l*.
- 1888 HALL, A. E., F.E.S., F.R.H.S., Cranfield House, Southwell, Notts. *l*.
- 1884 HALL, T. W., F.E.S., *Hon. Treasurer*, Stanhope, the Crescent, Croydon, Surrey; and 61, West Smithfield, E.C. *l*.
- 1891 HAMM, A. H., 22, Southfields Road, Oxford. *l*.
- 1906 HAMMOND, L., Letchmere, Alden Lane, Purley. *l*.
- 1903 HARE, E. J., F.E.S., 7, New Square, Lincoln's Inn, W.C. *l*.
- 1911 HARRIS, P. F., 8, Gresham Road, Brixton, S.W.
- 1913 HAYNES, E. B., 17, Denmark Avenue, Wimbledon, S.W. *l*.
- 1905 HILL, E., Roseneath, 3, Dorville Road, Lee, S.E. *l*.
- 1888 HILLMAN, T. S., F.E.S., 11, Eastgate Street, Lewes, Sussex. *l*.
- 1911 HOLDING, A., 95, Kyverdale Road, Stoke Newington, N. *l*.
- 1889 HORNE, A., F.E.S., 60, Gladstone Place, Aberdeen. *l*.
- 1910 HUMM, P. S., L.D.S., 56, Victoria Street, Westminster. *l*.
- 1914 JACKSON, W. H., Holmfield, Plough Road, Purley, Surrey. *l*.
- 1886 JÄGER, J., 65, St. Quentin's Avenue, North Kensington, W. *l*.
- 1886 KANE, W. F. DE V., M.A., F.E.S., M.R.I.A., Dadmans' Sittingbourne, Kent. *l, mi, marine invertebrata*.
- 1898 KAYE, W. J., F.E.S., Caracas, Ditton Hill, Surbiton, Surrey. *l, S. American l*.
- 1900 KEMP, S. W., B.A., F.E.S., Indian Museum, Calcutta. *l, c*.
- 1910 KIDNER, A. R., The Oaks, Station Road, Sidecup, Kent. *l*.
- 1914 LEEDS, H. A., 2, Pendercroft Road, Knebworth, Herts. *l*.
- 1911 LESLIE, J. H., F.E.S., 84, Huron Road, Tooting Common, S.W. *l*.
- 1903 LISTER, W. K., F.E.S., Street End, Ash, near Canterbury. *l*.
- 1912 LLOYD, C. T., Camden House, Feltham Hill Road, Ashford Common, Middlesex.
- 1896 LUCAS, W. J., B.A., F.E.S., 28, Knight's Park, Kingston-on-Thames. *Brit. o., odonata, n, m, b*.
- 1910 LYLE, G. T., Bank House, Brockenhurst, Hants. *h, l*.
- 1892 MAIN, H., B.Sc., F.E.S., Almondale, Buckingham Road, S. Woodford, Essex. *l*.
- 1886 MANGER, W. T., 100, Manor Road, New Cross, S.E. *l, c, cr*.
- 1889 MANSBRIDGE, W., F.E.S., 4, Norwich Road, Wavertree, Liverpool. *l*.
- 1912 MARTIN, H. W., Brickholt Cranham, Stroud, Glos. *l*.
- 1885 MERA, A. W., Outwood, High Road, Loughton, Essex. *l*.

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- 1881 MILES, W. H., F.E.S., 7, Church Lane, Calcutta. Post Box 126. *mi, b.*
- 1880 MONTIERO, A. A. DE C., F.E.S., 70, Rua do Alecrim, Lisbon.
- 1889 MOORE, H., F.E.S., 12, Lower Road, Rotherhithe, S.E. *l, h, d, e l, e h, e d, mi.*
- 1910 MORFORD, D. R., 16, Spencer Road, Cottenham Park, Wimbledon, Surrey. *l.*
- 1911 MORICE, The Rev. F. D., M.A., F.E.S., Brunswick, Mt. Hermon Woking. (*Life Member.*) *h.*
- 1912 NEAVE, B. W., Lyndhurst, 95, Queen's Road, Brownswood Park, N. *l.*
- 1906 NEWMAN, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l.*
- 1911 PAGE, H. E., F.E.S., Bertrose, Gellatly Road, New Cross, S.E. *l.*
- 1915 PEARSON, G. B., 5, Upper Bedford Place, Russell Sq., W.C. *l.*
- 1908 PENNINGTON, F., Oxford Mansions, Oxford Circus, W. *l.*
- 1880 PERKINS, V. R., F.E.S., Wotton-under-Edge, Gloucestershire, *l, h, d.*
- 1911 PESKETT, G. E. H., Llanberis, 37, Woodbury Grove, Finsbury Park, N. *l.*
- 1887 PORRITT, G. T., F.L.S., F.E.S., Elm Lea, Dalton, Huddersfield. *l, n.*
- 1912 POULTON, PROF. E. B., D.Sc., M.A., F.R.S., F.L.S., F.E.S., Wykeham House, Oxford. (*Hon. Member.*)
- 1897 PREST, E. E. B., Corrie, Ashted, Surrey. *l.*
- 1903 PRISKE, R. A. R., F.E.S., 9, Melbourne Avenue, W. Ealing, W. *l, m.*
- 1911 QUARRINGTON, A., 14, The Broadway, West Norwood, S.E. *l.*
- 1902 RAYWARD, A. L., F.E.S., Rockford, Beechwood Road, Sanderstead, Surrey. *l.*
- 1887 RICE, D. J., 8, Grove Mansions, North Side, Clapham Common, S.W. *orn.*
- 1902 RILEY, N. D., 94, Drakefield Road, Upper Tooting, S.W. *l.*
- 1910 ROBERTSON, G. S., M.D., St. Anne's, 101, Thurlow Park Road, Dulwich, S.E. *l.*
- 1887 ROBINSON, A., B.A., 5, King's Bench Walk, Temple, E.C. *l.*
- 1894 ROBINSON, LEIGH, F.Z.S., 4, Queen's Walk, Ealing, W. *l.*
- 1911 ROBINSON, Lady MAUD, F.E.S., Worksop Manor, Notts. *l, n.*
- 1887 ROUTLEDGE, G. B., F.E.S., Tarn Lodge, Heads Nook, Carlisle. *l, c.*

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- 1900 ROWDEN, A. O., 3, Archibald Road, Exeter. *l, b.*
- 1904 ROWLAND-BROWN, H., F.E.S., Oxhey Grove, Harrow Weald. *l.*
- 1890 ROWNTREE, J. H., Scalby Nabo, Scarborough, Yorks. *l.*
- 1898 RUSSELL, A., F.E.S., Wilverley, Dale Road, Purley. *l.*
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- 1888 SAUZÉ, H. A., 35, Collingtree Road, Sydenham, S.E. *l.*
- 1914 SCHMASSMANN, W., Beulah Lodge, London Road, Enfield, N. *l.*
- 1902 SCOLLIQ, A. J., F.E.S., "Devonia," Coburg Terrace, Sidmouth, Devon. *l.*
- 1910 SCORER, A. G., F.E.S., Hillcrest, Chilworth, Guildford. *l.*
- 1911 SENNETT, N.S., F.E.S., 32, Bolton Gardens, S. Kensington, S.W. *c.*
- 1910 SHELDON, W. G., F.E.S., Youldgreave, South Croydon. *l.*
- 1898 SICH, ALF., F.E.S., Corney House, Chiswick, W. *l.*
- 1903 SMALLMAN, R. S., F.E.S., Eliot Lodge, Albemarle Road, Beckenham, Kent. *l.*
- 1908 SMITH, B. H., B.A., F.E.S., Edgehill, Warlingham, Surrey. *l.*
- 1890 SMITH, WALTER, 227, High St., Hampton Hill, Middlesex. *l.*
- 1890 SMITH, WILLIAM, 13, St. Mirren Street, Paisley. *l.*
- 1882 SOUTH, R., F.E.S., 4, Mapesbury Court, Shoot-up-Hill, Brondesbury, N.W. *l.*
- 1908 SPERRING, C. W., 8, Eastcombe Avenue, Charlton. *l.*
- 1912 STALLMAN, F. H., Braemar, Thurlow Park Road, Dulwich, S.E. *l.*
- 1878 STANDEN, R., F.L.S., F.E.S., Newlyn, Romsey, Hants. (*Life member.*) *l, b.*
- 1872 STEP, E., F.L.S. Oakwood House, Barnett Wood Lane, Ashted, Surrey. *b, m, cr.; Insects, all Orders.*
- 1909 STONE, F. J.,
- 1910 STONEHAM, Lieut. H. F., F.E.S., Stoneleigh, Reigate. *orn, l.*
- 1913 STOREY, GILBERT, Dept. of Agriculture, Cairo, Egypt. *Econ. Ent.*
- 1911 STOWELL, E. A. C., B.A. (Oxon.), Laleham, Bexhill. *l.*
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- 1916 SYMS, E. E., 22, Woodlands Avenue, Wanstead, N.E. *l.*
- 1894 TARBAT, Rev. J. E., M.A., Fareham, Hants. *l, ool.*

YEAR OF
ELECTION.

- 1913 TATCHEL, L., 23, The Arcade, Bournemouth. *l.*
- 1910 TAUTZ, P. H., Cranleigh, Nower Hill, Pinner. *l.*
- 1911 TODD, R. G., The Limes, Hadley Green, Barnet. *l.*
- 1902 TONGE, A. E., F.E.S., Aincroft, Grammar School Hill, Reigate. *l.*
- 1895 TUNALEY, HY., F.E.S., Castleton, Searle Road, Farnham. *l, h.*
- 1887 TURNER, H. J., F.E.S., *President*, 98, Drakefell Road, New Cross, S.E. *l, c, n, he, b.*
- 1889 VINE, A. C., 45, Temple Street, Brighton, Sussex. *l.*
- 1889 WAINWRIGHT, C. J., F.E.S., 45, Handsworth Wood Road, Handsworth, Staffs. *l. d.*
- 1911 WAKELY, L. D., 34, Lancaster Road, Wimbledon Common, S.W. *l.*
- 1880 WALKER, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c.*
- 1886 WALSINGHAM, The Right Hon. Lord, M.A., LL.D., F.R.S., F.L.S., F.Z.S., F.E.S., &c. (*Hon. member.*) *l, orn.*
- 1888 WEBB, S., Sussex House, Shepherds Well, Dover. *l.*
- 1911 WELLS, H. O., Inchiquin, Lynwood Avenue, Epsom. *l.*
- 1872 WEST, W., *Hon. Curator*, 8, Morden Hill, Lewisham Road, S.E. *l, c, he.*
- 1878 WEST, W., L.D.S., Holmwood, Barnett Wood Lane, Ashted, Surrey. *l, mi.*
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.E.S., 37, Gloucester Place, W. *l.*
- 1887 WHIFFEN, W. H., Holmwood Lodge, Laton Rd., Hastings. *l.*
- 1914 WILLIAMS, B. S., 77, Durham Road, E. Finchley, N.W. *l.*
- 1912 WILLIAMS, C. B., B.A., F.E.S., Department of Agriculture, Trinidad. *l.*
- 1905 WINKWORTH, J. T., 290, Burdett Road, E. *l.*

Members will greatly oblige by informing the Hon. Sec. of any errors in, additions to, or alterations required in the above Addresses and descriptions.

REPORT OF THE COUNCIL, 1915.



THE Council of the South London Entomological and Natural History Society, in presenting the forty-fourth Annual Report, is pleased to be able to say that the Society continues in a satisfactory condition.

During the year just passed 7 new members have been elected, 2 have resigned, 3 have been killed in action, and 1 died.

The Membership at present stands as follows: Hon. Members 3, Life Members 7, Ordinary Members, 162—total 172.

So far as it has been ascertained, 15 of our Members are, or have been, in the forces, of whom your Council regret to say 3 have been killed in action—Messrs. Gotch, Penn-Gaskell, and Morris. Lieut. H. F. Stoneham has been wounded, but has rejoined his regiment; while K. G. Blair has been in hospital, but has now returned to his duties; Major Fremlin has for many months been engaged in training officers for the Sanitary Corps; M. F. Bliss was in Serbia in the medical service; Major Cardew is engaged with the business of supplies on communications; Capt. R. R. Armstrong, after serving for a time with the H.A.C. in France, obtained his commission in the R.A.M.C., served in Gallipoli, and on his return to this country was given special research work in connection with spotted fever, and he now has the Brighton division, including Newhaven, Seaford and Eastbourne, under his care; while Dr. E. A. Cockayne is Temporary Surgeon, R.N.V.R. Of the following your Council have no further particulars:—H. W. Andrews, P. A. Buxton, C. P. Emmett, E. B. Haynes, N. D. Riley, N. S. Sennett, and J. S. St. Aubyn.

The Balance Sheet, duly audited, is printed on pages xiv, xv.

Considering the stress caused by the war, the meetings have been well attended. At the meeting on April 22nd, there was a Special Exhibition of Orders other than Lepidoptera; this continues to be of great interest to the members. At the Annual Special Exhibition of Varieties and other objects of interest, held in November,

the attendance although smaller was perhaps compensated for by a greater number of exhibits than in 1914, those in the Lepidoptera being very interesting.

Mr. Dennis has kindly filled the office of "Lanternist" to the satisfaction of those members who have exhibited slides.

Mr. D. R. Morford continues as Recorder of attendances.

The following is a list of "Papers" read before the Society :—

February 11th.—"Bird Life in the Scilly Isles. The Manx Shearwater," by F. W. Frohawk, F.E.S., M.D.O.U.

March 25th.—"The Odd Egg in a Clutch," by C. W. Colthrup.

April 8th.—"Seasonal Dimorphism," by Dr. Dixey, F.R.S.

May 13th.—"Life-cycle of *Tortrix viridana*," by A. Sich, F.E.S.

May 27th.—"On the Maple Aphis," by E. J. Bunnett, M.A.

October 28th.—"British Cockroaches," by W. J. Lucas, B.A.

November 11th.—"Limacology, British Naked Mollusca," by A. Sich, F.E.S.

January 13th.—"The Genus *Melanargia*," by J. Platt Barrett, F.E.S.

January 27th.—"British Crickets," by W. J. Lucas, B.A.

January 27th.—"The Autumn Butterflies at Eastbourne," by R. Adkin, F.E.S.

The Honorary Curator, Mr. West (Greenwich), reports that the only addition to the Cabinets has been a pair of the rare beetle, *Scymnus arcuatus*, presented by the Rev. W. Perry, who captured them on ivy at Henley-on-Thames.

The Honorary Librarian, Mr. A. W. Dods, reports that the usual periodicals and many other volumes have been added to the Society's book-cases.

There have been five Field Meetings during the year.

March 27th.—To OXSHOTT, conducted by Mr. W. J. KAYE.

May 29th.—To PICKETT'S HOLE and RANMORE COMMON, conducted by Mr. Hy. J. TURNER.

June 19th.—To OTFORD, conducted by Mr. R. ADKIN.

July 3rd.—To SWINLEY WOODS, conducted by Mr. B. S. CURWEN.

September 11th.—To CLAYGATE, conducted by Mr. Hy. J. TURNER.

Reports of these meetings, furnished by the respective conductors, will be found in the "Proceedings."

Messrs. S. Edwards and Hy. J. Turner were the Society's delegates to the Annual Congress of the South-Eastern Union of Scientific Societies, held in June, at Brighton. The report of this will be found in the "Proceedings."

The Volume of Proceedings published during the past year consists of xvii. and 159 pages, with ten plates and a map.

The following is a list of the additions to the Library :—

Books.

- "British Lepidoptera," J. W. Tutt, vol. xi.
- "Zoological Record. Insecta," Dr. Sharp.
- "Osteology of the Armoured Dinosauria of the U.S.A."
- "Bombyces of America," vol. iii., Dr. Packard.
- "American Hybrids."
- "Monograph of the Mollusca of Florida."
- "American Asteroidea."
- "Monograph of the Foraminifera of the N. Pacific."
- "Monograph of the Crinoids."
- "British Ants," H. Donisthorpe.
- "New Mammals from Brazil."

Magazines and Periodicals.

- "The Field" (British Butterflies, F. W. Frohawk).
- "Entomologist."
- "Entomologist's Monthly Magazine."
- "Irish Naturalist."
- "Entomological News."
- "Canadian Entomologist."
- "Entomologiska Tidskrift."
- "Naturalist."
- "Bulletin of the Soc. Ent. France."
- "Entomologist's Record."
- "Essex Naturalist."
- "Zoological Bidrag. Upsala."

Reports and Transactions of Societies.

- "Smithsonian Report for 1913."
- "United States Museum for 1914."
- "Wisconsin Academy."
- "British Association, 1914. Australia."
- "Field Museum of Natural History, Chicago."
- "Entomological Society of Ontario."
- "Horniman's Museum, 1914."
- "Torquay Natural History Society."
- "Ohio Naturalist's Society."
- "Hastings and Sussex N. H. Society."
- "Croydon N. H. and Scientific Society."
- "South-Eastern Naturalist."
- "Proceedings of the Smithsonian Institute, vol. 47."
- "Turton College of Marine Mollusca."
- "London Natural History Society, 1914."

Pamphlets and Separata.

- "Economy of Fleas and Bugs," A. W. Bacot, 3 nos.
- "In Search of Russian Butterflies," W. G. Sheldon.
- "The Genus Curetis," Dr. Chapman.
- "Immature Stages of Tenthredinoidea," McGillivray.
- "Note on Rhagothitis pomonella in Blueberries," W. Woods.
- "Two Clover Aphides," E. M. Patch.
- "Leaf Hoppers of Maine."
- "Species of Paniscum," U. S. A. Herbarium.
- "Colorado College of Science" (6 separata).
- "Entomological Notes from Cardiff," Hallett.
- "Fossil Birds, Yale University."
- "Flora of New Mexico."
- "Spiders," Yale University (2 separata).
- "The Genus Epinephele," P. A. Muschamp.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

STATEMENT OF ACCOUNTS FOR THE YEAR 1915.

xiv

REVENUE ACCOUNT.

<i>Expenditure.</i>	£ s. d.		<i>Income.</i>	£ s. d.
To Debit balance from 1914	5 7 9		By Subscriptions, 92 at 10/-	46 0 0
" One Year's rent	25 0 0		" " 12 " 7/6	4 10 0
" Insurance	1 4 0		" " 1 " 6/-	0 6 0
" Attendance one year	2 10 0		" " 5 " 5/-	1 5 0
" Subscription to South-Eastern Union	0 10 0		" " 12 " 2/6	1 10 0
" Postages, Stationery and Sundries:—			" " paid in advance	3 0 0
S. Edwards	5 18 0		" Arrears of Subscriptions received	5 17 6
H. J. Turner	10 0		" Entrance fees, 8 at 2/6	1 0 0
T. W. Hall	1 16 0		" Debit Balance	16 7 3
Entrance fees carried to Suspense Account	8 4 0			
" Vote to Publication Fund	1 0 0			
" Vote to Library Fund	35 0 0			
	1 0 0			
	£79 15 9			£79 15 9

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

(Held in Suspense.)

	£ s. d.		£ s. d.
To Balance	49 4 6	By Balance from 1914	48 4 6
		" Entrance fees, 1915	1 0 0
	£49 4 6		£49 4 6

LIBRARY FUND.

	£ s. d.		£ s. d.
To Binding (Andrews) ..	..	By Balance from 1914 ..	..
„ Subscription E.M.M. ..	..	„ Fines (1915) ..	..
„ Balance	..	„ Vote from Revenue Account	..
	£1 12 9		£1 12 9

PUBLICATION FUND.

	£ s. d.		£ s. d.
To Debit Balance (1914) ..	..	By Donations ..	..
„ Archer's Account for 1914 " Transactions "	..	„ Sale of " Proceedings " ..	..
„ Half Tone Engraving Co. ..	..	„ Vote from Revenue Account	..
		„ Debit Balance ..	..
	£58 11 11		£58 11 11

BALANCE SHEET.

	£ s. d.	Assets.	£ s. d.
To Debit Balance Revenue Account ..	..	By amount to Credit of Suspense Account ..	..
„ „ Publication Fund ..	..	„ „ Library Fund ..	..
„ „ Balance being excess of Assets over Liabilities ..	..	„ Amount of subscriptions in arrear, £24 17s. 6d., valued at..	..
	£57 8 3		£57 8 3

T. W. HALL, Audited and found correct, *January 24th*, 1916.

Hon. Treas.

B. S. CURWEN, }
F. B. CARR, } *Auditors.*

Seasonal Dimorphism.

By Dr. F. A. DIXEY, M.A., F.R.S.—*Read April 8th, 1915.*

In many parts of Europe there may be commonly seen, during the months of spring, a small brightly-coloured butterfly whose variegated mottling of tawny and black somewhat recalls the aspect of our familiar "small tortoise-shell," to which indeed it is closely related. Later on in the year the same localities are enlivened by the presence of a larger butterfly of very different appearance. This second insect shows a general ground-colour of very dark brown with an obscure mottling of a still deeper shade, the total effect being nearly black. Crossing the dark area of fore- and hindwing is a broken band of cream-colour or white; and this combination of dark ground-colour with pale median band gives the butterfly an aspect not unlike that of our British "white admiral." Of these two butterflies, the first received from Linnæus the specific name *lerana*, the second was called by him *prorsa*. The generic name given to these forms by entomologists at the present day is *Araschnia*, the two insects being therefore known as *Araschnia lerana* and *Araschnia prorsa* respectively.

Araschnia lerana, the bright little black-and-tawny butterfly, after flying about for some time in the spring sunshine, deposits eggs, just as our small tortoise-shell does, on plants of the common stinging-nettle. From these eggs emerges a brood of spiny caterpillars, which feed upon the stinging-nettle and in due course of time turn into chrysalises. About the month of July these chrysalises disclose the perfect insect, which one would naturally expect to be like the parent butterfly. But strange to say, instead of the brightly-mottled *Araschnia lerana*, what does come out of these chrysalises is the dark, pale-banded *Araschnia prorsa*. The caterpillars hatched from the eggs laid by *prorsa* feed up and pupate during the summer. Now these pupæ resulting from the eggs laid by *prorsa* may behave in either of two ways. They may either produce the perfect insect before the end of the warm weather, or they may last on as pupæ throughout the winter, not giving rise to the perfect butterfly until the succeeding spring. In the former case, the butterflies when they appear are of the *prorsa* form, like their parents; in the latter case they emerge, not as *prorsa*, but as the brightly-variegated form *lerana*. We thus see that one and the same kind of butterfly may exist in two forms so different in appearance from one another that they may be, and indeed have been by good authorities, considered

to belong to two entirely distinct species. This twofold aspect of the same species is what is known as dimorphism, and inasmuch as in the case that we have been considering the successive changes in aspect bear an evident relation to the successive changes of season, the particular kind of dimorphism here exhibited is known as "Seasonal Dimorphism."

The case of *Araschnia lerana* and *prorsa* is perhaps the longest-known instance of seasonal dimorphism among butterflies; but it by no means stands by itself. When our attention is once drawn to the existence of this phenomenon, we can trace the presence of a similar dimorphism in many other species; though it would be difficult to find, among European butterflies at least, so well-marked a case as that which we have just had under notice. But we have not far to go before meeting with another instance of seasonal dimorphism among butterflies with which everyone in this country is familiar. The green-veined white butterfly (*Ganoris napi*), one of the smaller species of common garden white, occurs in two forms which, though very far indeed from being so diverse as *Araschnia lerana* and *prorsa*, are yet quite easily distinguishable from each other. The specimens that fly in the spring have a grey tip to the forewing and the green veining of the underside strongly marked. From the eggs laid by this spring brood there results about July a brood in which the tip of the forewing is nearly black, while the green veining is much fainter and in some cases has almost disappeared. The relation of these differences with the change of season is as well-marked in this case as in the former; and although so very much slighter in degree, the dimorphism of the green-veined white is evidently similar in kind to that of *Araschnia lerana*. There are many other instances among the butterflies and moths of this country where more than one brood is produced in the course of the year; and if these instances are carefully examined, it will often be found that there is a constant difference in aspect between the broods, corresponding to the period in the annual cycle to which they belong. The difference may be slight or considerable; but in no case is it so conspicuous as in the butterfly with which we began.

It is now natural to ask whether this phenomenon of seasonal dimorphism is peculiar to temperate regions such as our own country and continental Europe, or whether an analogous state of things prevails in the tropics, where seasonal conditions differ widely from our own. Only a few years ago this question would have met with an uncertain answer; now, however, we are able to make a very positive statement on the subject.

In many parts of Africa there occurs a salmon-red or brick-red butterfly with black borders and spots, known as *Precis octaria*, and in the southern and eastern parts of its range as *Precis natalensis*. This handsome insect is to be met with chiefly in the wet season. In the same parts of Africa is found, during the dry months of the

year, a somewhat larger butterfly, of a dark violaceous blue colour with plentiful black markings, two conspicuous white spots near the apex of the forewings, and a deep red band running parallel with the margin of both fore- and hindwing. The name given to the insect just described is *Precis amestris*, the slightly different form found in the southern and eastern regions of Africa being known as *P. sesamus*. Looking at a specimen of *P. natalensis* side by side with one of *P. sesamus* from the same locality, we should be inclined to say that they were as different in aspect as two butterflies very well could be; and when Mr. Trimen published his famous book on South African butterflies (1887) he had no hesitation in considering them as entirely distinct from one another. But there were known at that time a few specimens which seemed to combine the characters of the two species in various proportions; one of these was figured by Mr. Trimen in his book. The existence of such transitional specimens was by him attributed to hybridisation between the two species.

It had, however, occurred to more than one naturalist that a different explanation of these intermediate forms was possible, and in the year 1896 Mr. G. A. K. Marshall made the definite suggestion that several seemingly distinct species of the genus *Precis*, including those now under discussion, could be ranked in pairs; each pair constituting a separate species existing in a two-fold form, one phase belonging to the wet and the other to the dry season. *Natalensis* and *sesamus* were thus pronounced to be seasonal phases of the same species; and two years later Mr. Marshall was able to supply an absolute proof of the truth of his suggestion, by breeding specimens of the dark blue *sesamus* from eggs laid by the salmon-coloured *natalensis*. This case is as striking in its way as that of the European *Araschnia levana* and *A. prorsa*. It was not long before Mr. Marshall obtained equally decisive proof of the correctness of his supposition in the case of another member of the same genus, for he succeeded in breeding two specimens of *Precis antilope* from eggs laid by the butterfly known as *Precis simia*. And during the next three years a similar relation was proved by breeding to exist between two more pairs of the genus *Precis*. Although the same indisputable proof has not yet been forthcoming in every other kind of *Precis*, there is now no reasonable doubt that Mr. Marshall's original suggestion was in accordance with the facts, and will in course of time be fully verified.

Many more instances of the same kind are now known to naturalists, but before considering any of these we may turn our attention for a time to the question of the meaning of these remarkable alternations in the life, not of the individual, but of the species itself. Ever since the promulgation by Darwin and Wallace of the theory of natural selection, most students of nature have trained themselves to look for some purpose in the outstanding features of all living beings. The search is not always successful, but in a very large

number of cases, increasing almost every day, it is found that utility either to the individual or the species is at the bottom of the characters which come under our observation, whether of aspect, structure or behaviour. The Darwinian view of organic nature is in fact strictly teleological, a term the use of which has sometimes been considered, I venture to think undeservedly, as involving a kind of reproach. Now is there, it may be asked, any reason to suppose that the phenomenon of seasonal dimorphism is of any benefit to the species which exhibit it? It would be difficult to give an answer that would apply to all the known cases. We should have, I think, to admit that the benefit, if any, is not always obvious. We can sometimes form conjectures of a greater or less degree of probability; something may be due to the past history of the species if it could be unravelled, and still more perhaps to what is called "correlation" with a really useful feature. But there certainly are cases in which we can assign a useful purpose to the seasonal change with a very high degree of probability indeed. Such a case is to be found in the genus *Precis* that we have just been considering.

Looking at the undersides of several species of *Precis*, we can see at once that they strongly resemble dead and withered leaves. The midrib of the leaf is represented by a stripe running across both fore- and hindwing, from the tip of the former to the posterior angle of the latter. This angle is often prolonged to look like a stalk, and the surface of the wings is apt to be mottled in a manner that suggests spots of decay or growths of microscopic fungi. Examining the matter a little more closely, we find that in many cases it is only the dry-season phase of the species that puts on the dead-leaf appearance, the wet-season phase of the same species showing no such resemblance at all. (See *P. simia* and *P. antilope*.) In other species both seasonal forms are like dead leaves beneath; but when this is the case, the resemblance is greater in the dry season than it is in the wet. Now when an insect goes out of its way, so to speak, in order to look like a leaf, a stick, or a bundle of dry grass, we may conclude with very great probability that there is a meaning in this departure, and that the meaning is the necessity of concealment, either for the purpose of approaching its prey unobserved, or of itself escaping the attention of enemies who desire to prey on it. We may therefore put down these dead-leaf appearances as instances of what Professor Poulton has called cryptic coloration, that is to say, coloration whose object is concealment. But now the question arises, why should this kind of protection be so much better developed in the dry season than in the wet, and why in some cases should it not be found in the wet-season forms at all? To this question a reasonable answer can be given.

It has been pointed out by Professor Poulton that insect-eating animals of all sorts in the tropics find it much harder to get their food in the dry season than in the wet. Many insects hide them-

selves away altogether during the months of drought; and although several kinds of butterflies remain in evidence, they are at that time usually much scarcer in individuals than they are during the rains. The consequence of this state of things is that the struggle for life becomes much keener in the dry than in the wet season. If a species is to survive this period of stress, it has to employ some highly efficient means of protection from its enemies, who from the scarcity of their provender are very much alive to any chance of a meal that presents itself. The wonderfully close resemblance to such an object as a dead leaf affords in all probability an especially good means of protection, and no doubt many individuals of these species of butterflies owe their survival through the period of exceptional danger to this mode of defence. In the wet season, on the other hand, insect life is abundant. Many butterflies produce several successive broods in the course of the rains, and hosts of beetles, flies, and other winged creatures make their appearance at the same time. Hence the insect-eating birds and lizards find a large choice open to them of easily-obtained food; there is less occasion to search and scrutinise, and the persecution of butterflies becomes so much less strenuous, that the need for a protective disguise loses much of its urgency. Hence we find that those species of *Precis* which show so close a resemblance to dead leaves in the dry season, tend to lose part or the whole of that resemblance when the rains begin.

But although in the wet season the need for protection grows less, it does not entirely disappear. We have just recalled the fact that some species of *Precis* keep up their cryptic character during the wet months, though to a diminished extent. But we have still to account for the extraordinary change in such species as *Precis antilope* and *P. archesia*, where we have the highly cryptic dry-season phase replaced in the wet season by a form which is not only not cryptic but is actually conspicuous in a high degree. Now when we see an insect making no attempt at concealment, but flaunting, as it were, a conspicuous colour-pattern in the face of all the world, we frequently find that that insect is disliked and avoided by some of the usual insect-eating animals. Whether the avoidance is a matter of instinct, or, as is much more probable in the majority of cases, the result of unpleasant experience, it is obviously in the interest of the distasteful insect to advertise its undesirable qualities as much as possible, as for instance by brilliantly contrasted colours in conjunction with a slow mode of flight, or a choice of resting-place well open to observation. This is the well-known "warning-colour" theory of Wallace, a theory which has received much support not only from the studies of naturalists in the field, but also from experiments actually conducted upon birds and other animals in captivity. The suggestion has been made by Professor Poulton, and there is certainly a great deal to be said in its favour, that the bright colours of these wet-season forms of *Precis* are of the nature of danger-signals, warning enemies that an attack on them would be

unprofitable. The likelihood of this being the true explanation is increased when we enquire into the habits as well as the colours of the species in question. Remarkable as is the change of aspect in passing from one time of year to another, the change of behaviour in the successive broods is perhaps even more astonishing. Thus in the case of *Precis antilope*, Mr. Marshall, who has had great opportunities of studying the habits of butterflies of this group in nature, informs us that "the dry-season form only frequents the bush, settling on the ground among the dead leaves, or very rarely on small plants, the underside colouring affording it excellent protection. As the season advances the habits of the insect change, and the latter form may be found . . . frequenting open tops of kopjes, flying boldly about within a limited area, and settling with expanded wings on shrubs and bushes." With regard to *P. archesia* he notes that "the dry phase generally frequents the wooded and the wet phase the open country." The same correspondence of habit with change of aspect is also observable in the species of *Precis* from which we started, viz., *P. sesamus*. Here the underside of the dry phase, though not specially leaf-like, is well adapted for concealment in shady places. These are the places which it most affects, and, according to Mr. Marshall, "if alarmed it flies off with a rapid, and often zigzag flight, settling abruptly among rocks or herbage, when its greenish-black underside colouring is equally protective." The wet-season form, on the other hand, says Mr. Trimen, "frequents open, grassy hills, especially their summit ridges or highest points, and is very conspicuous, whether flying or settled." From all this it appears that, speaking generally, not only the aspect but also the habits of the cryptic dry-season forms are such as to aid concealment; while the behaviour of the wet-season forms seems to court observation, the choice of locality and the mode of flight being such as to display their conspicuous aspect to the best advantage. And these last are just the characters which we should look for in an insect protected by some unpalatable quality, or possibly itself palatable but depending for its safety on its resemblance to some unpalatable model. In the latter case the warning feature would of course be false instead of true, inasmuch as it would give a deceptive suggestion of a nauseous quality that did not really belong to it. This leads us straight to the interesting subject of mimicry, into which I do not propose at this time to enter, further than to remark that there is good reason to suppose that some of these wet-season forms have been affected by contact with the great group of distasteful butterflies known as *Acræas*, either in the way of actual mimicry, or in the way of forming with them an inedible group making use of a common warning pattern. In the latter case we should have to suppose that the dry-season phase, notwithstanding its cryptic habit, is also distasteful; for it is very unlikely, though perhaps not absolutely inconceivable, that the butterfly should accompany its seasonal change of aspect and habits with a

corresponding change from nauseousness to palatability. But there is really no great difficulty here. It is true that provision for concealment generally goes with edible qualities, but there is good evidence that distasteful forms exist which adopt the cryptic mode of defence at one time, and the warning, or as Professor Poulton calls it, the aposematic mode at another. If this is true of the life of the individual, there can be no reason why it should not also obtain in the successive phases of the species, and we may therefore, I think, conclude that as regards these forms of *Precis* at least, we have gone some way towards finding the meaning of the seasonal change. In the wet season, when insect food is plentiful and enemies are fastidious, it is safe to display warning colours—whether true or false we need not now enquire—and to push them to the front. In the dry season, when food is scarce and enemies will eat almost anything they can get, the best chance is to keep out of their notice altogether. The contrast between the two forms of defence is perhaps best seen in *Precis archesia*, where, as Professor Poulton has pointed out, the very same feature, viz., the diagonal stripe from tip to posterior angle, becomes at one time a part of the cryptic sham by representing the midrib of a dead leaf, and at another time is developed into the most prominent element in a violently conspicuous pattern.

Now that we seem to have found a principle which helps us to understand the seasonal changes in these particular butterflies, let us see how far it can be made to apply to other cases of the same phenomenon. There is an interesting genus named *Byblia*, which for our present purpose may be looked upon as consisting of two species—*Byblia ilithyia*, which is common to India and Africa, and *Byblia götzins*, which is found in Africa only. Now each of these butterflies occurs in two distinct phases, so distinct from one another indeed that, just as in the case of *Precis*, they were at first thought to be different species, and received separate specific names. But from the ascertained facts of the times of their appearance, and from the very frequent occurrence of the transitional forms, much more common in these butterflies than in most species of *Precis*, it was soon suspected that the supposed distinct species were merely seasonal phases of the same butterfly. All possible doubt on the subject was set at rest by Mr. Marshall, who in each of these butterflies, *Byblia ilithyia* and *Byblia götzins*, actually bred specimens of one phase from eggs laid by a parent belonging to the other phase, thus supplying the most conclusive possible proof of specific identity. In these *Byblies*, it is to the underside that we must look for the chief differences between the wet and dry-season forms. In each case we find that the wet-season phase has a variegated appearance, the ground-colour being tawny and the region of the wings nearest the body being furnished with an array of small black spots. In the dry season the ground-colour of the forewings becomes darker, and the hindwing puts on an entirely different appearance. The wing is

now of a deep chestnut-brown colour, and is crossed by three cream-coloured stripes. The black spots have almost disappeared; in specimens where the dry-season character is extreme, they have entirely vanished. Now comes the question, can we explain this remarkable seasonal change on the analogy of *Precis*? I think there is little doubt that we can. Looking at the underside of the dry-season form, we should at first sight be inclined to think that it must be conspicuous. But when we find from observation in the field that the butterfly is accustomed to settle with its wings closed over its back, so as to show the underside, among dried grass stems, we see that the peculiar striping is really well adapted to aid concealment. In the wet season the striping is lost altogether in *B. götzius*, partly so in *B. ilithyia*. The butterfly now presents a rough resemblance to some of the small *Acraeas*, and probably derives some protection from its likeness to that distasteful group of insects. That this supposition is not merely imaginary appears likely from some experiments made by Mr. Marshall with captive baboons. We have, therefore, in *Byblia* the same kind of alternation as in *Precis*, between the cryptic disguise of the dry season and the warning or mimetic aspect of the wet.

There are other cases in which the same principle will help us to an explanation. In many parts of the world the dry soil which is left exposed after the withering of vegetation is reddish in colour. It is constantly found that the undersides of butterflies belonging to certain groups assume in the dry season a reddish hue, which corresponds closely with the peculiar character of the soil. The African white butterflies with purple tips, belonging to the genus *Teracolus*, are good instances of this defensive coloration. One of these butterflies, settling on the ground and closing its wings over its back, becomes very difficult to distinguish from its surroundings, as I know from personal experience in South Africa. In the wet season a few of these butterflies retain the red-earth suffusion of their under-surface, but the greater number lose it. It is not always possible to assign any particular significance to the wet-season aspect of the insects now referred to; it may be, however, that some of them are mimics, while others may exhibit what are spoken of as "directive marks," features, that is, which serve to divert the attacks of enemies to non-vital parts, and so permit the escape of the butterfly at some sacrifice of its personal appearance. In all the cases, however, it is to be observed that the method of cryptic resemblance, which is probably the most efficacious mode of defence, is the one employed during the perilous period of the dry season. At other times of the year, when the struggle is less severe, the protection becomes correspondingly less complete. Another point to be observed is that the defensive coloration, whether cryptic or mimetic, is mainly concentrated on the under-surface, that being the surface which is exposed when the insect is at rest. This seems to indicate that the enemies against whose attacks it is most necessary to be provided,

are not so much those which pursue and capture butterflies on the wing, as those that track them down and seize them when settled and at rest.

From all this it appears that we can with a good deal of probability attribute a significance founded on utility to many of these instances of seasonal dimorphism. But, as so often happens in biological enquiry, before we have gone very far we have to recognise that the case is not so simple as it looked at first sight. Let us consider another instance. The little golden-red copper butterfly, so familiar an object in our fields and gardens, has several broods in the course of the year. In a certain part of its range the butterfly is seasonally dimorphic, the spring brood being of the well-known golden-red colour, and the subsequent brood or broods, which have passed through all their stages in the late spring and summer, showing an intermixture of dark scales which give a different aspect to the perfect insect. It is impossible to maintain with any confidence that this change in appearance is of advantage to the species. We must be content with the knowledge that the dimorphism is in some way or other dependent on climatic conditions, but at this point we have to stop. We cannot, with our present knowledge at any rate, claim the seasonal variation of the copper butterfly as an adaptation to the varying conditions of its environment; the alternation between light and dark must be put down as the direct result of some external influence, probably that of temperature. The same is very likely the case with other instances of seasonal dimorphism, those for example which occur in the white butterflies belonging to the African and Asiatic genus *Belenois*.

But whether the seasonal changes are adaptive, that is to say beneficial, or not, there is no doubt that they are determined by the action of some external condition upon an organism which is so constituted as to respond to that action in a particular direction. It is not a case of simple alternation between the two phases, because we find in many instances that the number of successive broods belonging to one phase depends upon the character of the particular season to which that phase belongs. In tropical countries, for example, it is often the rule that more generations of a given species are produced during the rains than during the drought. An exceptionally prolonged wet season will give rise to an exceptionally large number of successive broods, all of the wet-season form. These wet-season broods will go on being produced until the weather changes, when they will in due course be replaced by the dry-season phase. If the species were so constituted as to produce say three wet-season generations to one dry in regular succession, the change in the butterfly would simply follow the almanack without reference to any hastening or retarding of the change of season; but, as we have seen, the generations of the butterfly tend to be regulated by the weather, however much this may happen to be out of correspondence with the usual conditions prevailing at the actual time of year.

Since then the dimorphism we are speaking of is evidently so completely dependent upon meteorological conditions, it is natural to enquire whether some of these conditions cannot be artificially reproduced, and whether we cannot by imitating the change of season, induce a butterfly which was preparing to emerge in one phase to adopt the other in its stead. A good many experiments have been made by different observers with a view to answering this question, and the results obtained by them are of great interest. An early worker in this department of research was Dorfmeister, who found that by subjecting the pupæ of the summer brood of *Araschnia levana* to a lower temperature than they would meet with under normal conditions, he was able to induce several of the resulting butterflies to emerge as an intermediate form between *levana* and *prorsa*, instead of the ordinary *prorsa*, as they would have done under natural circumstances. Several experiments of a similar kind were afterwards made by Weismann in Freiburg and by Standfuss in Zürich, but the most completely successful results with this species have been obtained by my friend Mr. Merrifield, of Brighton, a former President of the Entomological Society of London, who is certainly the greatest authority in this country on the artificial production of seasonal variations. Mr. Merrifield finds, as others have done, that by subjecting the summer pupæ of *A. levana* to a low temperature, it is possible in many instances to ensure the emergence of the butterflies as a second generation of *levana*, instead of *prorsa*. But the converse change, that of the normal winter phase into that of the summer, by applying warmth to pupæ, if possible at all, is attended with very great difficulty. On the other hand, by employing the treatment of high or low temperature in the larval (or caterpillar) instead of in the pupal period, he has succeeded in the complete conversion of either phase into the other. His experiments show conclusively that in this species it is not the pupal, but the larval stage which is most susceptible to the influence of temperature. An interesting difference between the two kinds of conversion made itself manifest in these investigations. The transformation of the summer into the winter phase was found to be readily effected in all except the very last period of larval growth, while the converse change of the winter phase into the summer was, as a rule, only brought about when the larvæ were exposed to artificial warmth from the time of hatching.

In this species, and in others experimented upon by Mr. Merrifield, there is no doubt that temperature, if not the only, is at any rate the chief determining factor in the seasonal transformation; but there is much reason to think that this is not universally the case. In tropical countries generally, the most obvious meteorological difference between the seasons is the alternation between rains and drought rather than between heat and cold; and it appears from the combined testimony of many observers, and also to some extent from actual experiment, that in such regions degrees of dryness or of

moisture enter as a factor into the conditions which regulate the aspect of seasonally dimorphic butterflies. Thus Colonel Manders conducted some experiments in Ceylon which showed that abnormal conditions of dryness applied during the larval period, with no alteration of temperature, were capable of causing specimens of *Catopsilia pyranthe*, a dimorphic species somewhat resembling our "brimstone" butterfly, to assume the spring instead of the autumnal or winter aspect.

Some very interesting investigations by Mr. G. A. K. Marshall, in Mashonaland, point to a similar conclusion. There is a large genus of butterflies, mostly African, known as *Teracolus*. Many of the species of this genus are the subjects of a well-marked seasonal dimorphism; so well-marked, in fact, that for a long time the seasonal phases were treated as different species and received distinct specific names, just as in the case of *Araschnia lerana* and *A. prorsa*. Mr. Marshall experimented on two of these species, *Teracolus omphale*, and *T. achine*, both white butterflies with orange tips, as follows:—He reared some larvæ which under ordinary conditions would have resulted in dry-season butterflies, under artificial conditions of warmth and moisture. The butterflies which emerged during the height of the dry season were of the wet-season phase; the transformation being a little more complete in some which had been exposed to the experimental conditions both as larvæ and as pupæ, than in others which had been so exposed as larvæ alone. On the other hand, some larvæ which had been reared under normal conditions, but subjected as pupæ to moist heat, gave rise to butterflies which showed little or no change from the dry-season forms that were captured on the wing at the same time. These experiments demonstrated that in these two *Teracoli*, as in the *Araschnias* investigated by Mr. Merrifield, it is the larval and not the pupal stage that is most susceptible to the climatic influence. Indeed the pupal stage in these *Teracoli* appears to be almost entirely resistant to experimental interference, while in the *Araschnias* it is by no means inaccessible to such influence, though much less so than the larval period.

That this principle does not hold good in all cases was clearly shown by some further experiments by Mr. Marshall on *Belenois severina*, a white butterfly common in most parts of Africa south of the Sahara. Here no perceptible effect was produced by exposing the larvæ to damp heat, but when the same artificial conditions were applied to both larva and pupa, the resulting butterflies were transformed into the full wet-season form, though the brood under ordinary circumstances would have belonged to the dry-season phase. Hence we must conclude that in *Belenois severina* it is the pupal and not the larval stage that is most susceptible. A further result of great interest emerged from the experiments on this species. When the larvæ and pupæ were exposed to moisture alone without additional heat, the butterflies were found to have assumed the bright

yellow ground coloration of the hindwing underside characteristic of the wet season, while the dark veining of the same area, a feature belonging to the dry-season phase, was not only present but was strongly accentuated.

There is still another set of facts to be taken into account before we can claim to have exhausted even the elements of Seasonal Dimorphism. It is this: that even in cases where the dependence upon season of the change in aspect is well established, the two forms may often be found on the wing at the same time. Mr. Crawshay captured all three forms of *Precis sesamus*, the "wet," the "dry" and the "intermediate," within little more than a week of each other. The two forms, or phases, of *Catopsilia pomona*, were observed together in large numbers in the Kangra Valley of the Western Himalayas by Mr. G. C. Dudgeon. Other naturalists have recorded similar facts both of *Catopsilia pomona* and of its near relative *Catopsilia pyranthe*. And yet there is no doubt, on the testimony of quite first-rate authorities, that at all events in many parts of their range the diverse phases of both these butterflies are to some extent dependent on the change of season. Many other instances could be given of the simultaneous occurrence of forms well known to be seasonal, and also of forms which are closely analogous to ascertained cases of seasonal dimorphism, though the actual proof of their seasonal character may be lacking. Some of these instances of simultaneous occurrence may be put down to overlapping at the change from wet to dry and *vice versâ*, the new brood emerging while the former one is still on the wing. But there are many cases which cannot be explained in this way, and indeed all that we can safely say seems to be that several of these dimorphic phases, though under certain circumstances and in certain parts of their geographical range, they may be confined to their respective seasons, under other circumstances and in other localities may occur indiscriminately and without reference to the meteorological conditions prevailing at the time of their appearance. Taking the fact of these irregularities into consideration, we find it by no means easy to decide between two opposite views of the origin of seasonal dimorphism. On the one hand the dimorphism may be supposed to have arisen as a direct adaptation to external conditions, and afterwards, in consequence of extension of the range of the species, or of alteration in those external conditions, to have more or less fallen out of correspondence with the changes of season. On the other hand the dimorphism may have had an entirely independent origin, but have subsequently been brought, under the influence of natural selection, into a more or less intimate relation with local and seasonal conditions. It is quite conceivable that both principles may have been concerned in the production of the state of things now open to our observation.

Two further facts may be borne in mind in considering the simultaneous occurrence of different seasonal forms. One is that

the members of the same brood may show great individual differences in their response to what are to all appearance identical conditions. Thus Mr. Marshall on one occasion reared under precisely similar conditions the larvæ resulting from two eggs laid on the same day by the same parent butterfly. One of these emerged as *Precis natalensis* and the other as *Precis sesamus*. The second fact is that, as we have seen, there is much difference between one species and another in the period of immature life at which the application of the requisite stimulus is most effective. In some cases, as has been conclusively shown by Mr. Merrifield, the application of artificial warmth during even the last few days of the pupal period may exert a considerable effect upon the seasonal colouring. Now it has been observed by more than one naturalist that it is in generally hot and dry localities, such as Aden, that the various seasonal forms are most often to be seen on the wing together. Such regions are liable to occasional heavy rainfalls of a temporary character, and it is perhaps possible that these sudden interruptions of the general conditions of aridity may last long enough to cause those species that happen to be in the specially susceptible stage to assume the wet-season appearance, though their actual emergence in the perfect condition may take place during the usual drought. Other species, not in the sensitive period of their life-history, may be unaffected by the temporary moisture, and may show on emergence nothing but the aspect which is ordinarily associated with the dry season. These considerations are doubtless not sufficient to account for all the apparent anomalies that occur, but they go some way towards suggesting an explanation that may apply to many of them.

We may now put together what we have learned on the subject of Seasonal Dimorphism in Butterflies.

(1) We have seen that one and the same kind of butterfly may appear under aspects so diverse that they have been considered to belong to entirely different species.

(2) These different phases of the same insect are often found to appear each at its own time of the year. Thus, in the case of *Araschnia levana*, the *levana* form appears in the spring, the *prorsa* form in the summer.

(3) Many species of butterfly which produce more than one generation in the course of the year show this kind of seasonal dimorphism. The degree in which the difference is manifested varies greatly from species to species, every transition being found between a difference so slight as to be scarcely noticeable, and a diversity so extreme that nothing short of the breeding of one form from the other could be accepted as sufficient evidence of their specific identity.

(4) Seasonal dimorphism is found not only in the butterflies of temperate regions, where the most obvious difference between the seasons is one of temperature, but also in those of the tropics, where

the change of season is principally marked by the alternation of rains and drought.

(5) In many cases, though with our present knowledge not in all, it is possible to discern utility to the life of the species in the seasonal changes undergone by successive generations. As a general rule in tropical butterflies, the dry-season phase tends to be cryptic, or adapted for concealment, and the wet-season phase to be aposematic, or adapted for the display of warning colours, which may be either true or false. The latter come under the head of Batesian mimicry. The habits of the insect may undergo a change corresponding with the difference in aspect.

(6) The method of concealment is probably on the whole a more efficient mode of defence than the method of display; and accordingly we find it more often employed in the dry season, when, from the scarcity of insect food, the need of protection against insect-eating enemies is felt in greatest measure.

(7) Seasonal Dimorphism is not a case of simple alternation of generations, but it is determined by the influence of some external condition upon an organism so constituted as to react to that influence in a definite direction.

(8) These external conditions can be imitated by artificial means. In the case of the insects of temperate countries, such as the *Araschnias*, the needful stimulus appears to be that of temperature; in the case of tropical insects, moisture and dryness appear to be contributing factors.

(9) The stimulus is not equally operative at all stages of growth. In some instances, as the *Teracoli*, the larval period is the most susceptible; in others, as *Belenois severina*, the pupal.

(10) Though the dependence upon season of these changes in aspect is in many cases well established, it is often the case, especially in dry and arid districts such as the neighbourhood of Aden, that the different phases may be found on the wing together. Some of these cases may arise from individual differences of susceptibility between members of the same brood, others from a natural overlapping at the change of seasons, and others again from the effect of a temporary change in meteorological conditions upon insects that happen to be at that particular time in the most susceptible stage of their growth.

This concludes what I have to say on the present occasion about the subject of Seasonal Dimorphism in Butterflies.

Life cycle of *Tortrix viridana*, L.

By ALFRED SICH, F.E.S. Read May 12th, 1915.

The common little green moth, *Tortrix viridana*, L., is usually such an abundant insect that entomologists can obtain all specimens required without the slightest difficulty. No one therefore has previously had any need to breed this species, much less to rear it from the egg. Consequently, when in 1914 some questions were asked as to its life-history, with the idea of combating its ravages, no definite answers were forthcoming. It being then the middle of May, and therefore too late to examine the earlier stages, a number of larvæ and pupæ were collected, and from these a supply of ova were subsequently obtained. Fortunately these hatched in the Spring of 1915, before the young larvæ appeared in the open, so that the behaviour of the captives gave a key to the habits of the larvæ in their natural state. It was then not a great difficulty to find them on the trees and to discover how they passed the rest of their lives. The only point still left undiscovered is the position on the tree where the eggs are laid. There is little doubt, however, that this must be on the bark of the branches. There was no opportunity in 1915 of watching the females in the act of oviposition. Such an opportunity would, of course, settle the matter. Oak is no doubt the chief foodplant of this species, and for that reason, as well as on account of the abundance of the insect on this tree, no other kind of tree was taken into consideration.

In the South of England the moth flies in June. The males may be seen in numbers on the wing around oaks in the late afternoon. They soon lose their vivid green colour and become very bleached. While the males are flying the females may be seen sitting on the upper surface of the oak leaves. Their more restful habits enable them to retain their colour for a much longer period. The males seek the females among the foliage and, judging from captive specimens, it seems probable that the moths remain together for several hours, and that occasionally a moth of either sex will pair more than once. In my opinion there is no doubt that the eggs are laid on the bark of the branches of the oak, but I have not yet succeeded in finding any eggs of this species in nature. They are not laid on the leaves nor on the twigs of the first or second year's growth.

The dulness of the newly-hatched larva lends colour to the suggestion that it may have to travel along the dark oak twigs before

reaching a leaf-bud in which it can hide. From observations detailed later, it may be gathered that the flat eggs are usually laid in June or July in pairs, one partly overlapping the other, and that the moth then covers them with scales from her body and with débris from the oak bark. Eggs so deposited would be extremely difficult to discover. This species hibernates in the egg stage and the larva, making a small almond-shaped hole in the top of the egg-shell, crawls out at the end of April or beginning of May. It has a black head and a dull ochreous-grey body. On leaving the egg the larva makes its way to a leaf-bud that has just burst and hides itself in the interior. I have seen them wandering over buds still enclosed in the brown scales, and they appear to have no power of biting through the scales as the larvæ of some other species do. The young oak leaves break through the scales at the apex of the bud, and it is here where the larva enters. It remains in the interior of the bud, out of sight, until at least after its first change of skin. Sometimes it spins a few threads of silk over its dwelling, but these do not prevent the bud from expanding. After feeding for a day or two on the tender leaves in the heart of the bud it becomes more slender, paler in colour, and developes a dark band, visible both dorsally and ventrally; this is not a pigmented mark but is internal and appears to be the digestive organ and its contents.

After about four days from its entry into the bud, the larva, having eaten out a small chamber, lies up for its first change of skin. This it usually accomplishes in about twenty-four hours. If during these five days the oak bud has not much expanded, the larva will pass its second stadium in the interior. But if, as frequently happens, the bud has begun to spread, the larva will take up its abode on the mid-rib of a leaf not yet fully expanded, where it is protected by the two sides of the leaf folding over above it. In this dwelling it lives feeding chiefly at the apex of the leaf. Except in size its appearance is scarcely altered. In the first two stadia the very minute larvæ are weak and inactive. They are difficult to discover as they remain so well hidden in the young reddish-brown oak leaves.

After another three or four days the larva, changing its skin a second time, reaches the third stage in its life cycle. Here it makes a distinct advance. The black tubercles, forming so conspicuous a feature in the older larva, now become visible, and the caterpillar itself is much more active than when younger. It now forms a dwelling by turning down the edge of a leaf and fastening it with silk threads. It feeds on the cuticle and the parenchyma of the leaf inside its dwelling and also eats out holes in the leaf. It is still of an ochreous-grey with a broad smoky band.

At the end of a further period of four or five days, it again undergoes a change of skin. The larva reaches this, the fourth stage, about the second week in May. It is now about 7mm. in length and fairly stout, the head and thoracic shield are black, while the

thorax and a broad band along the dorsum are dark smoky-grey with a greenish tinge, the lower portions of the larva are lighter, with an ochreous tinge. The black tubercular spots are large and very conspicuous. There are no skin markings whatever. The caterpillar now turns over a large portion of a leaf, frequently the whole of one side, parallel with the mid-rib. It is now very active and, if disturbed, runs with great ease up or down the length of its gallery, and, if the annoyance continues, will drop out on a thread of silk. It eats the apex of its own leaf and portions of neighbouring leaves, and in four or five days' time lies up for its last larval change.

This last usually occupies about forty-eight hours. After the change the larva may have a black or a brown head; the prothoracic shield is ochreous and divided down the centre by a pale line; the body is of similar colour to that of the larva when in the fourth stage but still darker. The larva at this period, the commencement of the fifth stage, is darker than at any other time, but after a day or two, as it begins to increase in size, so it gradually loses its depth of colour until finally, just when fully grown, it becomes very pale green. The black tubercular spots, however, remain strikingly conspicuous. The larva measures about 18mm. and is quite stout. It hides itself by day in a dwelling made by folding over a lobe or the whole apex of a leaf and fastening this with silken thread to the portion adjoining. Occasionally the caterpillars will live between two leaves spun together, but I have never found *T. viridana* larvæ in rolled leaves. I have found a great many leaves on oaks rolled up from the apex at right angles to the mid-rib, but these invariably contained the larva of *Cacoccia xylosteana*. The larva remains in the fifth stage for seven or eight days, and it is during this period that most of the damage is done to the oak leaves. The larva reaches this stage about the third week in May, when the leaves are green and still tender, but of nearly their normal size. The apical portions of the leaves are especially attacked and all but the mid-rib and the stouter lateral ribs are eaten. Less advanced leaves often found on the terminal shoots at this time are entirely consumed. When full-grown the larva, which has now become quite plump, prepares for the pupal change. In most cases it secretes itself in its last dwelling, but when the foliage has been too severely damaged to afford shelter the caterpillars will move to any neighbouring plant and spin up in leaves even of a kind on which they would probably not have fed. The white silken cocoons vary in toughness, some larvæ being content with a slight lining to their dwellings, while others use a much greater quantity of silk.

The pupa remains in the cocoon from two to three weeks. When the moth is ready for emergence the pupa case is thrust through the cocoon, usually as far as the fourth or fifth abdominal segment, and the moth, after freeing itself from the case, clings to it or to the leaf while it expands its wings. When this operation is complete,

the moth usually crawls to the underside of a leaf and settles down with the wings covering the body in a flat roof-like manner.

Such is the life cycle of this little moth when all goes well with it, but like every living being, it has its enemies and its misfortunes. The young larvæ are sometimes killed by Hemiptera which, gaining access to their dwellings, pierce their delicate skins and suck their juices. The larva of a hymenopterous parasite, which Mr. Morley has kindly identified as *Pimpla maculata*, Fab., destroys many. It lives in the bodies of the larvæ and pupæ, making its escape when perfect by biting off the top of the pupa shell. Sometimes the larva fails in the attempt to change its skin and death ensues. It appears also that very wet weather is often fatal to larvæ.

In captivity the female will pair the same day that she emerges from the pupa, and will commence laying ova a few hours after pairing. The first ova observed in 1914 were laid on June 5th at the junction of the side and the glass top of the box in which the moths were confined. They were placed in pairs, one partly overlapping the other, and both were covered with gum and hidden beneath a mass of scales from the extremity of the moth's body. This mass of gum and scales terminated in a point above the ova and I witnessed the moth raising and depressing her abdomen repeatedly and drawing out the gum to a point. These cones, consisting of two ova, gum and scales, were constructed by many of the females, and it therefore seems probable that this method of oviposition is the one usually adopted.

Some moths after forming a few cones commenced to lay eggs in small groups in the manner usually followed by other species of the Tortricina. A few females laid all their eggs in groups. In both cases the ova were concealed by scales and débris. In one cage sprays of oak leaves with twigs of the first and second year were placed, and also one much older piece of branch with rough bark, the last was the only portion to receive ova though many were deposited on the muslin sleeve as is usual when moths are confined in similar cages.

Ovum pale yellow when first laid, afterwards becoming orange-brown, more or less circular in outline, very much flattened above and below. When first laid more like a circular tablet than a scale. It measures about 0.74mm. in diameter. The surface sculpture consists of impressions like those made on hammered copper, but in most of the ova examined these marks were entirely obliterated by the impressions caused by the adhering scales from the moth. The oval stage lasts from nine to ten months.

It may be useful to give a few details of the larva in its different stages. It is an ordinary caterpillar with three pairs of true legs, four pairs of abdominal prolegs, and a pair of posterior prolegs or claspers. In its first three stages it is rather slender, becoming stout in the two remaining stages. The measurements of the width of the head are given (in millimetres), as by the aid of these the stages of the larva can be ascertained. The heads of any stage vary slightly in width, but within certain limits, so that the largest

head of the first stage could not well be mistaken for the smallest head in the next stage, and so on.

1st Stage.—Head black, width 0.28mm. Collar of prothorax grey. Prothoracic shield brown, body pale greyish-ochreous, with a dark internal band visible dorsally and ventrally. The newly-hatched larva is rather short and broad, without the dark band and thickly covered with strong spicules. After feeding a day or two it becomes more slender, paler in colour, and the spicules, though of course, present, are less noticeable as the skin is not now so contracted as it is before the larva has fed. Length 1.3mm.

2nd Stage.—Head black, width 0.42mm. The larva in this stage is like the feeding larva of the 1st stage except that it is of course larger and the prothoracic shield is black. The tubercular spots are still inconspicuous.

3rd Stage.—Head black, width 0.65mm. In colour and form the larva is much like those of the two preceding stages, but the tubercles are now distinctly visible and the larva decidedly shows greater activity.

4th Stage.—Head black, width 0.96. Shield black, collar of prothorax grey. Thoracic segments and a broad band along the body dark smoky grey with a green tinge, lower parts of the body with an ochreous tint, and paler in colour. Tubercles black, very conspicuous. Length 7mm.

5th Stage.—Width of head 1.7mm. When newly changed the larva is dark grey and much like that of the 4th instar, but the shield is divided longitudinally down the centre by a pale line. In all the previous stages the shield is undivided. As the larva grows it becomes pale green, the dorsum being a grey green, while the lateral portions are more of a yellowish or lighter green. The black tubercular spots are large and conspicuous, especially on the back of the larva and the dark line of the pulsating vessel is now clearly visible. The colour of the head of the male larva is usually, if not always, black, but in the female the head may be black, brown clouded with black, or simply brown. The prothoracic shield is ochreous divided down the centre by a pale line with usually a dark spot on each side of the line at the posterior border of the shield. The thoracic legs are black marked, while the prolegs and claspers are pale green with brown hooklets. The skin of the larva is thickly covered with rather long spicules which may easily be seen under a lens. There is nothing especial about the position of the black tubercular plates. As usual I, II and III are nearly in line on the meso- and meta-thorax, and these have each two hairs or setæ. On the abdominal segments II lies behind I, and III above the spiracle (which is not conspicuous), these only have one seta. IV and V almost on the same plate are situated on the lateral fold which runs along the body of larva. VI is present above the proleg, while VII below it is formed of a group of three small tubercles. VIII is very small and lies on the ventral side of the proleg. On the ninth abdominal segment most of the tubercles have again two setæ, while one of them has three. The anal shield is usually only slightly darker than the ground colour. The skin of the larva is sufficiently transparent to admit of portions of the spiracular tubes to be seen. There is an anal comb with eight teeth. The larva varies somewhat in ground colour, some specimens being of a very pale grey with scarcely a tinge of green, and in these specimens the tubercular plates are brown and less conspicuous.

The moths bred from the pale larvæ were all females. The larva of *Tortrix loeflingiana* is exceedingly like that of *T. viridana*, but it is smaller and more ochreous posteriorly.

The pupa varies in coloration. It is perhaps most often entirely black. Sometimes, while the wing- and other limb-cases remain black, the abdomen may be dark brown. Frequently the pupa is absolutely brown. This variation of colour is not affected by the sex of the pupa. The cremaster is very short and blunt. To this is attached the cable of silk which prevents the pupa dropping out of the cocoon when the moth emerges.

In conclusion, I will mention that of 62 cocoons, gathered at random off oaks, 51, or 82%, produced *Tortrix viridana*. Three female pupæ of this species produced hymenopterous parasites and one pupa died. Thus nearly 89% of the pupa gathered belonged to the green Tortrix. The first emerged June 8th, the last June 18th. The sexes were equally divided in the 34 instances noted. Of the remaining seven pupæ, four yielded *Pandemis ribeana*, one, *Tortrix loeflingiana*, one, *Cacoecia lecheana* and one, *Gypsonoma dealbana*, all belonging to the Tortricina.

The dates of the appearances of the various stages of this insect will vary from year to year in sympathy with the advancement or retardation of the Spring and also in accordance with the latitude of the locality investigated.

The Maple Aphis and its Dimorphic Larva.

By E. J. BUNNETT, M.A. *Read May 27th, 1915.*

The Maple Aphis, to which the name *Chaitophorus aceris* was given by Linnæus, occurs, according to Buckton, in the following various forms:—

- (i) *An apterous viviparous female*, some of which are green and others entirely black.
- (ii) *A winged viviparous female*, some bright green, others slightly larger and shining black.
- (iii) *The pupa* with green wing-cases and otherwise very similar to the apterous viviparous female.
- (iv) *An oviparous apterous female* which is said to deposit its eggs in November and December.
- (v) *The males*, which occur in two forms simultaneously, some apterous and some alate.

This Maple Aphis may be found plentifully on various species of *Acer* in this country, *e.g.*:—

- A. pseudoplatanus* (Sycamore),
- A. platanoides* (Norway Maple),
- A. campestre* (Field Maple),
- A. monspessulanum* (Montpelier Maple),
- A. negundo* (Box-elder),

on all of which I have taken it myself.

There are two forms of the young which appear simultaneously, the one normal; the other, the curious form which was described in 1852 by Thornton and named by him *Phyllophorus testudinatus*.

In 1858 Lane Clark observed it and gave it the name of *Chelymormpha testudo*.

Four years later Van der Hoeven described it under the name of *Periphyllus testudo*.

So far all had agreed in regarding this strange little insect as the larva of some unknown aphis.

In 1867 Balbiani and Signoret published an engraving of the dimorphic larva and stated that the same green viviparous female of *Chaitophorus aceris* individually produced both the normal and abnormal larval forms.

The live specimens exhibited at this meeting including 26 of the dimorphic larvæ on a single leaf of *pseudoplatanus* are the first I have found this season.

Buckton gives an interesting account of the dimorphic form* illustrated by drawings.†

He describes and depicts the curious appearance of the dorsum, "tessellated like the carapace of a tortoise." I have, however, failed to discern outlines of these plates on the upper part of the dorsal region as shown in his figure, and I have not therefore drawn them in my own.

From an examination of many specimens I find the number of transparent leaflets or folioles on the margins of the flattened abdomen and anal plate to be twenty.

On the head eight, besides a small narrow one on the base of each antenna.

On the outer margin of each tibiæ of the first pair of legs, eight or nine, and two on the tarsus.

On the third pair of legs these appendages are not foliaceous but are reduced to long triangular, almost linear hairs.

The tarsi of all the legs are terminated by two claws.

The folioles on the head and abdomen are orbicular, those on the bases of the antennæ and on the legs are narrowly ovate and acute.

Buckton states that "each foliole contains a radiating system of vessels, which Signoret regards as ramifying nerves."

The generative organs appear to remain extremely rudimentary and indistinct, and since the insect rarely exerts itself by movement of any kind during the three or four months of its existence, it is at present impossible to imagine what use this dimorphic form can be to the species.

Balbani and Signoret asserted that the insect neither moults nor undergoes any metamorphosis whatever. Buckton, on the contrary, states that he had clear proof that the skin was occasionally shed, and that he possessed casts complete, even to the folioles or flabellæ.

Moreover, he says, "I have every reason to believe that when such moults occur the insect emerges without folioles, such organs being replaced by tufts of hair." In plate lxxix. he figures a specimen found so close to the slough (also figured) that he had no doubt it emerged from it.

In this figure the folioles are no longer present as such, but are reduced to hairs, and the appearance of this instar is now extremely similar to that of the normal young larva.

According to Balbani and Signoret, the green viviparous female is the parent of the dimorph; but Buckton figured a black variety of the apterous viviparous female, which he tells us "yielded on dissection, June 25th, nine young, which unmistakeably showed they were of the abnormal kind." He adds, "several of the pseudo-morphic young were, moreover, scattered on the same leaf which supported the aphid, and I conclude were born of her."

* "Brit. Aphides," vol. ii., pp. 126-133.

† Pl. lxxix.

As Buckton's evidence concerning the parentage of this dimorph appears to be limited to (i) the accounts of others as enumerated above, (ii) his personal observations on dissection of one apterous female, it may be of interest to record the following observations:—

In June of last year (1914) I segregated two of the black apterous forms with a small piece of sycamore leaf, each in a separate tube.

The following day two or three of the young dimorphic forms were present, but as the tube had contained the shreds of leaf this evidence was not sufficiently conclusive.

I therefore removed the black females each to a clean empty tube at 10 p.m., on Sunday, June 21st. On the following Monday morning, at 8.30, I examined the tubes just in time to see a green larva being expelled by the female.

I was not at leisure to remain at this critical moment, but on my return at mid-day the *Periphyllus* (or dimorphic) form was there fully developed. The following day, Tuesday, at 8.17 p.m., I had the pleasure of seeing the same black female in the act of bringing forth another green larva, the whole of which, except the head, had been extruded.

The margins of the body were folded downwards, so that a transverse section of the abdomen would have exhibited a curve nearly semicircular.

There was nothing to be seen from above of legs, antennæ, or any of the peripheral leaflets.

By 8.26 three of the folioles were perceptible. A minute later the antennæ were free.

At 8.28 all the abdominal folioles could be discerned; the legs appeared and were in motion.

There was also a slight extension of some organ from the anal region, and the whole of the body was flattening out.

By 8.34 the head was liberated and the birth was complete.

The mother immediately walked away, leaving her extraordinary offspring to its fate.

At 8 p.m. on the following Thursday the same tube contained eight young, all of them of the pseudomorphic variety.

The other isolated female also produced several larvæ of the same kind.

The problem relating to the use to the species of this abnormal larva, which, so far as seems to be known at present, performs no other function than that of feeding, remains unsolved.

It is, however, difficult to believe that nature should produce, in such abundance, a creature that completes its existence without being of any service whatever to its kind.

The following are notes on some observations made subsequently to the reading of the Paper:—

- (1) On June 24th Mr. W. West, of Ashtead, kindly furnished me with some leaves of *Acer negundo* (Box-elder).

On a single leaflet of one of the compound leaves I counted 84 of the pseudomorphic larvæ together with seven cast skins of the same.

The question as to whether these abnormal larvæ moult is thus no longer in doubt.

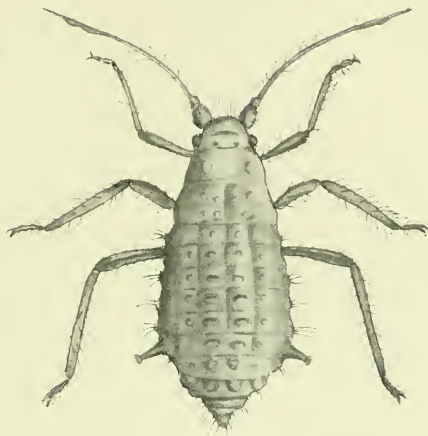
The larvæ on this leaflet were, without exception, of the pseudomorphic ("*Periphyllus*") form.

- (2) The ramifications of the "nerves" in the folioles of these sloughs were, in some cases, clearly seen to be filled with air, thus demonstrating their vascular character.
- (3) From the same leaves of Box-elder I removed 24 black winged females, and deposited them in four tubes, placing six aphides in each tube. Three days after, one of these tubes contained a live pseudomorph.

This establishes the fact that both the *alate* and *apterous* black females may produce the pseudomorphic larvæ.

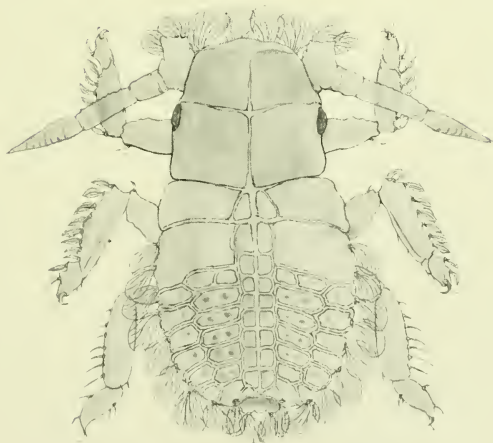
- (4) In the month of July I obtained two larvæ of the *normal* form from an isolated black apterous female.
- (5) July 22nd. On a single leaf of *Acer campestre* I counted on the upper side 269 pseudomorphic larvæ and on the lower side 98, making a total of 367 on the whole leaf.

PLATE IV.



1.

E J B



2.

E J B

1. CHAITOPHORUS ACERIS ♀ PARENT × 22.

2. ABNORMAL LARVA × 91.

On the Metamorphosis of *Geotrupes stercorarius*, L.

By CONSTANT SANO (*Member of the "Wettenschappelijke Kring," of Antwerp*). Read October 14th, 1915.

In early Spring the beetle may be seen flying about, especially in the evening. It searches for a fresh patch of cow- or horse-dung and begins to dig its nest beneath this. I found that, in the case of nests just started, the female only was present, and this indicates that the female makes the excavation. These nests vary very much in size and form. They consist generally of a more or less vertical tube, of length varying from 3 to 15cm., according to the hardness of the ground (the harder the ground, the shorter the tube), and then three or four horizontal branches running off in different directions. At about 2 to 3½cm. from the vertical tube these branches become somewhat broader and the extreme end is beautifully rounded. The broad part, which constitutes the food chamber, is nearly a regular cylinder, 6 to 8cm. long and 2 to 3cm. in diameter; while the tube giving access to it is oval and just wide enough to let the beetle pass freely carrying the food (*i.e.*, 1½ to 1¾cm. wide). The sand or clay removed is brought to the surface of the ground and put around the hole. When a food chamber is prepared, the first few charges of material are taken down and put at the extreme end. When 1 to 1½cm. of the chamber is filled up, a little oval cavity is made and its wall strengthened by some clay. The little cavity is destined to receive the egg.

In filling up the chambers the beetle works always in the same way. I several times saw, on opening already advanced nests, that the male was at the top of the tube and the female at the bottom, but the female was never found at the top. This indicates clearly that the female arranges the food below, while the male climbs up and down bringing the food to his companion.

The egg is of a pale greenish or yellowish-white colour, and is deposited in the little cavity, which is then closed, and the remainder of the food chamber is filled up with more dung till this reaches the vertical tube. The female then starts another food chamber from the bottom of the same vertical tube, and the process is carried through till three or four eggs are laid. When an egg is just laid it has a more elongated form than when it is about to hatch. It has, when just laid, a length of about 3½mm. to 4mm., and a thickness of 1½mm. to 1¾mm. When the date of hatching approaches

it swells up to about one and a half times its original volume, owing probably to the absorption of moisture. About fourteen to sixteen days after being laid, the egg hatches and a small larva appears. First it is completely white, but the head and mouthparts soon become darker. As soon as it has hatched the larva breaks through the clay wall of the little cavity and begins to feed and to grow. Then the abdomen turns to a slate colour owing to the dark food in the intestinal canal. It is interesting to watch a feeding larva. First it breaks off a little piece from the foodmass with the powerful mandibles and masticates it further with the second pair of jaws. Then it swallows it. The larva eats nearly the whole mass, but leaves a wall of about half a mm. thick. The duration of life of the larva is still more or less a question to me, but from some indications I am able to make a satisfactory conclusion. I found, for instance, that when the beetles were digging their nests in early spring, full grown larvæ could also be found. Some of these I kept alive and they pupated five weeks later. Secondly, at that time no half-grown larvæ could be found, and thirdly, where I found full-grown larvæ there was only a very slight trace of dung, and this was then usually covered up with dead leaves. Out of this I drew the following supposition:—

- i. Eggs laid in spring.
- ii. Larva hatches in about a fortnight and becomes full-fed in the following spring.
- iii. It pupates about the end of July.
- iv. The beetle is formed in the beginning of September and comes to the surface.
- v. Later on it makes a vertical tube, at the bottom of which it hibernates and comes out again the following spring, when egg-laying is commenced.

If this be true or not further experience will have to settle. But since I found no young larvæ in spring it is unlikely that eggs would be laid in September, because then the larvæ would be half-grown in spring. It follows also from this supposition that we must have two races of beetles, since from egg to egg, *i.e.*, from the time that an egg is laid till the beetle coming from this egg lays an egg, there elapse two years, and the beetle would only be found every other year. Some connection may exist between these two races, as it is known from other insects which usually take two years to complete their metamorphosis, that some hurry up in feeding and take only one year to come to maturity. This may then perhaps be sometimes the case with *Geotrupes*; but this is, at present, only a supposition.

The fullgrown larva is rather sharply bent. The abdominal segments are much broader than the thoracic, and measure $1\frac{1}{4}$ cm. to $1\frac{1}{2}$ cm. in the thickest part. The head is about 6mm. wide. The thorax near the head is 7mm., and near the abdomen 8mm. across. The whole length of the larva is about 4cm. to $4\frac{1}{2}$ cm. The head is

yellowish-brown as well as the legs, the mouth parts, however, are dark brown. The mandibles are furnished with several teeth. The thorax is dirty white. The abdomen is of a slate colour except the first and last segments, which are, like the thorax, dirty white. The dorsal vessel can be easily distinguished. It can be noticed that it widens out eight times, showing the presence of eight chambers connected by narrower tubes.

A rather interesting peculiarity can be observed on the second and third pairs of legs. The middle pair are longer than the anterior legs, and near the base of each is a flat rugose surface directed backwards and somewhat to the outside. The posterior pair are very small (smaller than the first) and in each the side of the penultimate segments directed towards the rugose surface is toothed. The larva produces a distinct stridulation by rubbing the teeth of the third pair against the rough surface on the second pair of legs. The vibration is very noticeable when an adult larva, or even the cell containing one, is held in the hand. This is quite startling when first experienced, and one feels nearly the same sensation as if one gets an electric current from a small coil through the hand. For what these stridulations are used I could not tell, but I suppose they serve as defence against enemies or strange insects penetrating the mass.

When the time for pupation arrives, the larva gets rid of all its undigested food and uses it to plaster the walls surrounding itself. The walls consist of unconsumed food and are at first in a very rough state, but are made quite firm and smooth, and the cavity is reduced in size to form the pupating cell.

When the cell is prepared, the larva lies on its back and the abdomen becomes shorter and much broader. It then awaits pupation. The undigested food is kept all the way through and is always used to plaster the final cell. When, however, the wall of the cavity in which the larva is feeding becomes injured or broken, the larva at once starts to repair this. Excreting some undigested food, it puts this on the border of the hole, and, taking some mouthfuls of food, mixes the whole up and thus obtains a rather moist mass with which it gradually closes the hole. Soon the moisture is absorbed by the other food and the new part becomes fairly hard.

When the pupa is just formed, it looks very pretty. It is then quite white. The lateral borders and disc of pronotum, as well as each abdominal segment, are covered with short brown bristles. The abdominal segment is furnished with two fleshy organs, a few mm. long, and directed laterally backwards. After remaining four to five weeks in the pupal state the perfect insect emerges from the pupal skin in September. A few days before the emergence of the beetle, the head, disc of pronotum, legs, and last abdominal segment begin to darken and, some time later, the whole pronotum, as well as the above-named parts, become almost black. The beetle,

at the time of disclosure, lies on its back and moves continuously the legs and abdomen. The skin splits just behind the head and slips over this towards the mouth and goes backwards over the ventral part. As the skin comes along it carries with it the white, silverlike lining of the tracheæ. When the beetle is completely free from the skin, it turns over on its ventral side and lifts up the elytra, which, together with the abdomen and underside of thorax, are completely white. Then slowly it stretches out simultaneously the two wings. After a couple of hours the white parts, except the membranes knitting the abdominal segments, become darker, and after five or six hours are all black with metallic reflection, except the second pair of wings, which are brownish and transparent, and are folded away below the elytra. The beetle is very shiny and looks as if wet, but after a while this lustre disappears and the beetle becomes duller. When coming to the surface the beetle does not always use the original tube made by the parent to take the food down, but works itself up displacing behind it the remaining food and the earth through which it passes.

The beetle is of a dark blue-black colour with metallic reflection, especially on the undersides. The female is, on an average, slightly larger than the male, but the difference is only very slight. The male can be distinguished from the female in having on the posterior trochanters and femora two equally sized teeth, while the female has none. Both sexes are able to produce a rather distinct noise by rubbing the abdomen against the hind femora.

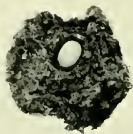
When the perfect beetle has emerged at the end of the summer it comes to the surface for feeding purposes, afterwards it digs a tube in which it will pass the winter. In the following spring it comes again to the surface and starts egg-laying.

EXPLANATION OF PLATE V.

Metamorphoses of *Geotrupes stercorarius*, L. (all natural size).

1. Egg in food mass.
2. Young larva just hatched, and empty egg-skin.
3. Full-grown larva in pupation chamber.
4. Larva in pupation chamber awaiting pupation.
5. Pupa just after disclosure.
6. Pupa just before liberation of the beetle.

PLATE V.



1



2.



3



4.



5



6.

Photos by H. Main.

METAMORPHOSES OF *GEOTRUPES STERCORARIUS*.

British Cockroaches.

By W. J. LUCAS, B.A., F.E.S. *Read October 28th, 1915.*

By referring to previous volumes of Proceedings it will be found that I have already read short papers on three of the subdivisions of the Orthoptera—the Forficulodea (earwigs) in 1912, the Acridiodea (short-horned grasshoppers) in 1913, and the Locustodea (long-horned grasshoppers) in 1914. In this paper I propose to review the Blattodea (cockroaches).

On November 8th, 1900, a correspondent of the "Daily Mail" said that "English kitchens breed dyspepsia, melancholia, influenza, and family jars." In the evening the "Globe" added, "they also breed blackbeetles."

Blackbeetles! As we have so often been told, this, the common name of these insects, is not a happy one, since they are neither black nor beetles. Another popular name—cockroach—seems scarcely more appropriate, since the creatures bearing it have no connection with either fowl or fish. The second name appears to be derived from the Spanish word "*cucaracha*"*; but if this means a "little berry," the fitness of the term again is not very apparent.

Two colloquial names attached to an insect proclaim it a familiar one; and it would seem that to the cockroaches the well-known proverb may with justice be applied, which says that "familiarity breeds contempt"—possibly even a stronger feeling still! No doubt few besides a limited number of entomologists have given close attention to these insects, and we may therefore with advantage spend a few moments in considering the British representatives of the Blattodea, as this sub-order of the Orthoptera has been named.

It is customary to divide the Orthoptera into seven groups, or sub-orders:—

1. *Forficulodea* (earwigs, etc.).
2. *Blattodea* (cockroaches).
3. *Mantodea* (praying insects).
4. *Phasmodea* (stick insects).
5. *Gryllodea* (crickets).
6. *Locustodea* (long-horned grasshoppers).
7. *Acridiodea* (short-horned grasshoppers).

* *Cucaracha*, however, means "woodlouse" also, and a curled-up woodlouse would not be so very unlike a cockroach ootheca.

We may define the BLATTODEA as :—

Orthoptera with all the legs more or less alike ; the large and free coxæ entirely covering the ventral surface of the thorax and the base of the abdomen ; tarsi of five segments. Head, in repose, bent under the thorax, so that the fore-part points backward ; antennæ long and slender (there being often nearly a hundred segments). Pronotum shield-like, frequently quite concealing the head. Wings with the anal region capable of fan-like folding (but the alar organs are variable and sometimes entirely absent). Cerci, variable in size and shape, present in both sexes ; a pair of slender styles also usually present in the male.

Twelve families are comprised within the sub-order Blattodea :—

- | | |
|-------|---------------------|
| W.B.* | 1. Ectobiidæ. |
| W.B. | 2. Phyllodromiidæ. |
| | 3. Nyctiboridæ. |
| | 4. Epilampridæ. |
| W.B. | 5. Periplanetidæ. |
| W.B. | 6. Panchloridæ. |
| | 7. Blaberidæ. |
| W. | 8. Corydidæ. |
| | 9. Oxyhaloidæ. |
| | 10. Perisphæriidæ. |
| | 11. Panesthiidæ. |
| | 12. Geoscapheusidæ. |

But five of these families are represented in western Europe. Of these, four contain species that are found to breed in Britain, though but one—*Ectobiidæ*—contains indigenous British insects.

No striking resemblance is borne by the typical cockroach to any other insect. Perhaps its next of kin—amongst the Forficulodea—approaches it most nearly in appearance ; but even between these the resemblance is not very great. The point about a cockroach that first engages attention is its extreme flatness, that is to say the narrow space that separates the dorsal from the ventral surface. This feature enables it easily to hide away in a narrow crevice during daylight, or should it be disturbed in the course of its mid-night revels.

Another point is the well-developed pronotum, which, besides often affording the means of differentiating species, serves as an efficient protection for head and thorax, just as the elytra, when present, are calculated to perform that office for the abdomen. In ordinary circumstances the head is bent under the pronotum, so that the front of the face is turned downward. Though the head is usually hidden thus beneath the pronotum and inclined face downward, it can be turned upward and outward, till the mouth-parts project considerably forward. Two small areas close to the eyes and to the insertion of the antennæ, of a paler colour than the

* W = represented in Western Europe ; B = represented in the British Isles.

parts around, and frequently membranous in structure, are called fenestræ. In the males of some species they are replaced by ocelli.

On glancing at the ventral surface we are at once confronted with two other striking points in cockroach anatomy—the enormous development of the coxæ of all the legs, and the spiny armament of the tibiæ.

In recent cockroaches the elytra and wings differ considerably in both shape and texture. Amongst the various species, too, there is much diversity in their length compared with that of the abdomen, being longer in some, abbreviated in others, while from some species they are absent altogether. In some cases the wings are less fully developed than the elytra, while the length of these appendages may be different in the two sexes. It might seem that here we have a ready means of grouping the various genera and species, but in practice it is found that the relative development of the alar organs is of slight importance, as indeed is the case throughout the Orthoptera.

Of the elytra the principal nervures, omitting the costa, are four in number, being named in order from the costal margin:—

- (a) the mediastinal;
- (b) the radial or scapular;
- (c) the median or ulnar (which sometimes is in duplicate, the two being called the anterior and posterior medians);
- (d) the dividing nervure.

The areas thus formed are:—

- (a) the mediastinal, above the nervure of the same name;
- (b) the radial or scapular;
- (c) the median;
- (d) the anal or axillary.

Being very variable and sometimes abbreviated, the median nervure is looked upon as unimportant, and consequently the whole of the area between the radial and dividing nervures is called the median. In the wing the principal nervures hold the same relative positions; but between the radial and the ulnar there is sometimes a prominent nervure called the “spurious”; the anal area, moreover, which at rest is folded longitudinally like a fan, often occupies more than half the wing and is much more delicate in structure than the anterior part, which in texture resembles to a great extent the elytron. Wings and elytra are both well filled with branches of the several nervures. It should be noticed that when the alar organs are folded there is no mid-dorsal suture, but the left elytron overlaps the right.

In each sex there appear to be ten abdominal segments, besides a couple of “podical plates” lying one on each side of the anus, which, according to Huxley, may represent the dorsal part of an eleventh. The first segment is rudimentary, especially the ventral plate. In the female the 8th and 9th segments are visible only when the abdomen is distended. In the same sex the ventral plate

of the 7th segment is of large size, and in the hinder part boat-shaped to assist in the discharge of the ootheca; the 10th segment is notched behind. The ventral plate of the seventh segment is called the *lamina subgenitalis*; in the male the ventral plate of the 9th segment goes by the same name, the dorsal plate of the same segment being called the *lamina supra-analis*.

From beneath the edges of the 10th segment in both sexes spring the cerci, which vary in length and shape, and are usually jointed, the number of segments in *Blatta orientalis* and *Periplaneta australasiae* being sixteen. Seeing that these appendages are supplied with large nerves, it would seem that they are not merely ornamental; perhaps they act as posterior antennæ. They often seem to vary in development almost in direct proportion to that of the alar organs, being apparently absent in many wingless forms, though search will reveal them as small plates.

Besides the cerci the males, in some species, have projecting from the *lamina subgenitalis*, two styles. These are absent from the adult females, though they are present in the nymphs. Perhaps they are homologues of the true legs, and if so constitute one more point tending to demonstrate how old, as a family, the cockroaches are.

Occasionally a female may be observed with a horny purse-like capsule protruding from the hinder end of her abdomen. This is the ootheca or egg-case. It is formed inside the body of the female, and in *Blatta orientalis* contains sixteen eggs in two rows of eight. Till that number is complete the case is carried about, and then after a time—some days may be—it is deposited. In one exotic species the case appears to be wanting, and it is possible that cockroaches of the past had it not, for Brogniart credits some with an exerted ovipositor.

When newly hatched the young are white with black eyes; but they soon assume their proper colour. They closely resemble the adults except for the absence of wings. Post-embryonic development is slight—another sign of the antiquity of the cockroach group. At from the fifth to the seventh ecdysis (the number is doubtful) the nymph becomes an imago, and in the winged species the organs of flight appear. How long an individual cockroach may live is uncertain, but it is supposed that the term of its existence may under favourable circumstances extend to five years.

Cockroaches will eat almost anything—even their own dead bodies, or at any rate those of their companions—but as Miall says, “cucumber disagrees with them horribly,” and luckily so do phosphorus-paste and some other insecticides. It must, however, be borne in mind that the cockroach has its place in nature. It is an effective scavenger and so far must be looked upon as a useful insect, and no doubt would be so regarded could we but conquer our rooted dislike to it, and the cockroach get rid of its unpleasant odour. Cockroaches are lovers of warmth and are really numerous

only in tropical regions. British cockroaches, too, lack the beautiful colours sometimes found in foreign species.

In the Silurian sandstone of Cavaldos, in France, the late M. Brogniart found a fossil, which he considered to be part of an elytron of a cockroach, and named it *Palaeoblattina dourvillei*. Brauer, however, thinks it more probably belongs to an insect like the mole-cricket, while Sharp inclines to the opinion that it does not belong to the Insecta at all. If there were no doubt concerning the identification this fragment would represent the oldest insect known.

It is in the Carboniferous period of Palæozoic times that cockroaches first appear with certainty upon the scene—or rather, that evidences of them first appear, which is probably a very different matter. The coal-measures of Great Britain, Belgium and Germany, and the coal-measures and mill-stone grit of America, have supplied a great number of cockroaches, which group of insects appears to have been more numerous and more generally distributed than any other at this period, which in fact has been called the “Age of Cockroaches.” The Permian period, has produced but few insects, though amongst them are several specimens of the Blattodea; but apparently none have come to light in this country.

Passing to Mesozoic times the Triassic rocks of America have produced a number of specimens of the Blattodea, but this is not the case in Europe. In the Lias fossil insects are numerous, and specimens of those we are considering are represented both in Britain and on the Continent. The Purbeck beds of the Upper Oolite have preserved several species, but they appear to be absent from the Cretaceous formations, as we should expect, seeing that a large proportion of these rocks are of marine origin and were deposited in deep water.

In Cainozoic times the Eocene period does not seem to have produced fossil cockroaches in Britain, but perhaps the conditions, under which the formations during the period were deposited, were not favourable to their preservation.

The rest of the Tertiary formations are absent from, or not well represented in Britain; but the Blattodea have left *some* remains in Miocene strata on the Continent, and a few have been preserved in amber. In the Post-tertiary period fossil insects are rare, except Coleoptera, to which order all must perhaps be referred.

Judging by the wings, from which almost entirely our knowledge of fossil cockroaches is derived, these insects are found to bear a close general resemblance to recent forms. They, however, present three important differences. First, the elytra and wings were similar in appearance and transparent; second, the same number of nervures was developed in both, whereas in recent forms they are reduced in number in the elytra; third, the arrangement of the nervures in the anal area was different. The wings rather than the elytra of recent cockroaches preserve more closely the appearance

of both wings and elytra of fossil forms. Since Palæozoic times cockroaches appear to have decreased in *numbers* greatly, if not so much in *size*, and they must now be looked upon as but a dwindling remnant of a dying race. Let the careful housewife find in this fact what consolation she may, and at any rate rejoice that she does not live in the Carboniferous period and have to combat the hosts of cockroaches that luxuriated in the warm moist climate of that far distant age.

ARTIFICIAL KEY TO BRITISH BLATTODEA.

A. Indigenous; living under natural conditions;
small.

- (a) Pronotum dark, with pale margins .. *10mm. *E. lapponicus*.
- (b) Pronotum pale, with dark markings on disc; very small 8mm. *E. panzeri*.
- (c) Pronotum pale, with a few dark dots .. 9·5mm. *E. perspicillaris*.

B. Naturalised; living under artificial conditions;
larger.

- (a) Dark; wings rudimentary in female, truncated in male 14mm. *B. orientalis*.
- (b) Wings developed in both sexes.
 - 1. Grey-brown; two dark lines on pronotum; rather small species .. 13mm. *B. germanica*.
 - 2. Sienna-brown; pronotum nearly concolorous; large species .. 33mm. *P. americana*.
 - 3. Sienna-brown; pronotum with yellow margin; mediastinal area yellow; large species 26mm. *P. australasica*.
 - 4. Very dark; pronotum chiefly black; size moderate 18mm. *L. surinamensis*.

If we were to admit to the British list all the cockroaches which under any circumstances have occurred here, the number of species would be quite considerable. It would be necessary to group them in three categories:—

- (a) Three *natives*, that is, undoubtedly indigenous species.
- (b) Five *naturalised aliens*, which seem now to be thoroughly established and to breed here, though not under natural conditions.
- (c) *Casual visitors*—a fair number, which should not, however, appear on our list, and which therefore I shall do little more than mention.

In the first group are three insects only:—*Ectobius lapponicus*, Linn.; *E. panzeri*, Steph., and *E. perspicillaris*, Fuessly. All live out of doors, on bushes, amongst herbage, and in similar situations. They are small, active insects, very delicate in structure, and with nothing at all repulsive in their appearance.

Ectobius lapponicus, Linn., though the largest of native British cockroaches, measures but 20mm. in wing-expanse in the male, the female is smaller still. Its darker colour separates it from *E. perspicillaris*, which is of nearly the same size, while its larger

* Approximate length from front of head in resting position to tip of abdomen.

proportions distinguish it from *E. panzeri*. It is important to note that the pronotum is black, or at least very dark, with the lateral margins pale and transparent. In the male the elytra and wings are fully developed, but in the female the former are truncate and the latter rudimentary. To obtain specimens perhaps the best method is to sweep nettles, heather, low bushes, and the long grass of rides in woods, to beat larger bushes and some trees, or to search under moss and dried leaves. It often comes to sugar and occasionally may be seen on the wing. It appears to be mature from May till September, but perhaps is met with most frequently in June and July. In Lapland it lives indoors and, according to Linnæus, consumes the dried fish of the inhabitants. *E. lapponicus* is common and widely distributed over central and northern Europe; but it is seldom found in the south, and then only at some elevation. In England it seems to be confined to the south and south-east. It has been taken in several localities, in Surrey—Oxshott, Albury, Gomshall, Horsley, Byfleet, Dorking, Haslemere, Devil's Punch Bowl, Penslake, and Ockham Common. A few localities in Sussex—Slindon, Wood Eartham, Dane Wood and Cocking—have been reported. It is often taken in the New Forest, and is recorded for Hants also in Pamber Forest and Parkhurst Forest in the Isle of Wight. Sunning Hill (Berks), Epping Forest (Essex), Exeter (vaults of City Bank), and Aldermaston (Devon) are all the remaining records that have come to hand.

Ectobius perspicillaris, Fuessly, is of about the same size as the last species, but is of a general pale straw-colour. The pronotum is of a reddish tinge; the disc has a few dark dots, and the margins are clear. In both sexes the elytra extend beyond the tip of the abdomen. The insect has a more southern range than *E. lapponicus*, being not very common in the northern part of Europe. It is widely distributed in the centre and south, however, and reaches to Algeria. There are very few certain records for England:—Box-hill, Woking, Reigate, and Mickleham (Surrey); near Tunbridge Wells and Faversham (Kent); Hastings, Slindon, Charlton Forest, and Bognor (Sussex). Other localities that have been mentioned are:—Devon, New Forest, Darenth Wood, and Birch Wood (Stephens), Ruislip, Bournemouth, Lulworth Cove, Co. Down. Luff says it is common in Guernsey and Alderney.

Ectobius panzeri, Steph., is the smallest of British cockroaches, the distance across the expanded wings being only 12mm. On the pronotum are some scattered dark markings, which are arranged somewhat in the form of two longitudinal lines. The elytra and wings are fully developed in the male, but in the female they are much abbreviated and quite useless as organs of flight. With us *E. panzeri* is usually a somewhat dark insect, some specimens, however, being much darker than others, especially in the legs. Stephens described this very dark form as a distinct species, under the name of *nigripes*. The fact is, however, that the insect becomes

darker the farther north it is found. English specimens may belong to either form, but apparently the majority are distinctly dark. In England the species is found along the south from Tresco, in Sicily, to Kent and even Suffolk. Its favourite haunt seems to be under rubbish amongst sandhills, or on a sandy shore. It is not, however, confined to the coast, for it occurs rather frequently on the New Forest heaths. It comes to sugar at times. At present, *E. panzeri* records are as follows:—*Cornwall*: Tresco, Lelant, Lizard, Kynance Cove. *Devon*: Kingsbridge, Plymouth, Wembury, Whitesand Bay, Exmouth, Berry Head, Tregantle, Dawlish, Slapton. *Dorset*: Lulworth Cove, St. Alban's Head, Studland, Portland, Chesil Beach, Glanvilles Wootton. *Hants*: Bournemouth, Boscombe, Christchurch, Hayling Island, New Forest, Blackgang Chine, St. Catherine's Point, Compton Bay, Alum Bay, Yarmouth. *Sussex*: Camber Sands. *Kent*: Deal, Sandwich, Sunny Carvet. *Suffolk*: Lowestoft, Felixstowe, Corton. Luff records the species from Guernsey and Alderney. Its total range appears to be confined to the western part of the Palearctic region—England, Channel Islands, Belgium, France, Spain, Switzerland, and less frequently Germany and Dalmatia, beyond which it does not seem to have been recorded.

We now pass to five insects, which, though not natives, are established in these islands, and breed here regularly but never out of doors—they all require *naturally* a warmer climate than our own. They have been spread through the influence of trade till they have become cosmopolitan.

***Blatella germanica*, Linn.**, is a rather small insect—at first sight not unlike an *Ectobius*. It may, however, be easily distinguished from a member of that genus by the lack of the “apical area” at the tip of the wings. The pronotum bears two longitudinal very dark lines dilated at the base. Popular opinion in France and Russia points to Germany as the home of this cockroach, a belief which Linnæus has stereotyped in its specific name. In Germany, however, it is called “*Russen*.” It lives in woods in central Europe—in Russia and Germany—while in the latter country it dwells in houses as well, as it does also in France. *B. germanica* is said to have been imported into England by the soldiers returning from the Crimea in 1857; but it was numerous in parts of the British Isles before that date. It is now found in large numbers in the Zoological Gardens, in warehouses at Bradford, in houses at Bognor, in restaurants and hotels in London, Hastings, Folkestone, etc., and in other places. At Aldershot, it is said, these cockroaches go by the name of “shiners,” which term is quite appropriate. *B. germanica* has a wide distribution: Britain, France, Spain, Germany, Austria, Italy, Russia, Algeria, Siberia, Japan, North America, Mexico, Guinea, Ceylon, Chili, Martinque, Jamaica.

***Blatta orientalis*, Linn.**, there should be no need to describe. In neither sex are the alar organs fully developed. In the mature

female both elytra and wings are very rudimentary and the insect resembles a nymph. *B. orientalis* has become so cosmopolitan in its distribution that there seems to be a doubt as to what was its original home. Linnæus says:—"Habitat in America, hospitate in Oriente." It is a native of America, but has taken up its abode in the East. Further he says:—"Hodie in Russiæ adjacentibus regionibus frequens incepit nuperis temporibus Holmiæ, 1739, uti dudum in Finlandia"—common at the present day in parts near Russia, it has lately, 1739, reached Stockholm, and but just appeared in Finland. He is mistaken with regard to America for *B. orientalis* is a native of the East and does not belie its name. Following the trade routes it made its way to Holland and England in the reign of Elizabeth. Early in the seventeenth century Swammerdam knew *B. orientalis* as an inhabitant of Holland, and spoke of it as:—"Insectum apud Indicum, sub nomine Kakkerlak satis notum"—the Indian insect well-known as Kakkerlak. In 1624 Moufet, in his "Insectorum Theatrum," speaks of its occurrence in wine cellars, etc., in England. It seems to have spread here slowly, for Gilbert White, in 1790, speaks of it as an unusual insect at Selborne, and it is quite possible that it may still be absent from some northern and western villages. It has, however, been observed in the Scilly Isles and in the Orkneys, as well as in the Isle of Man. By means of trade it has now spread practically all over the world, but it still inhabits principally Asia and Europe—almost always, it would seem, within doors.

Periplaneta americana, Linn., is a considerably larger insect with fully developed wings in both sexes. In colour it is of a nearly uniform rich sienna-brown; the central part of the pronotum is somewhat darker than the margins. The antennæ are particularly long. Hailing originally, it would seem, from South America, it has followed the trade routes over nearly all the world. From its being so great a pest on board many ships, it is sometimes known as the "ship-cockroach." In England it occurs in warehouses in London, Dover, Goole, and elsewhere, in the Royal Horticultural Society's Gardens at Chiswick, in a sugar refinery at Silvertown, and there is little doubt in many other places. As a casual also it is often met with. To Covent Garden it is introduced with fruit and vegetables, and it often reaches Kew Gardens in cases of plants from various parts of the world. Stephens recorded it as being frequently taken in London previous to 1835. According to Brunner:—"Cette Blattaire se rencontre dans le monde entier."

Periplaneta australasiæ, Fabr., is an elegant insect, somewhat smaller than its near relative, *P. americana*. The shorter antennæ, yellow mediastinal area, and the dark-centred pronotum with yellow border are sufficient to distinguish it from the last. Possibly this species is a native of Australia, but there seems to be considerable uncertainty on this point. Though undoubtedly established in Britain, it is a later arrival than *P. americana*. In 1886 it was

taken in Belfast, probably in a warehouse, and Mr. MacLachlan apparently thought this was its first record for Britain. Mr. C. W. Dale, however, had one, which he said was taken at Sherborne in 1839. It has been found very plentifully in the houses at Kew Gardens, and in Swanmore Park Gardens at Bishop's Waltham in Hants, and has been reported from other places. It has been frequently mentioned as occurring in orchid houses, where apparently it is harmful to the plants. As regards its distribution the following localities have been recorded:—Britain, Belgium, Sweden, Madeira, Florida, St. Thomas, Sumatra, Java, Australia, West Indies, Colombia, Brazil, and Central America.

Leucophæa surinamensis, Linn., though larger than *B. germanica* is a comparatively small cockroach of a very dark colour; the wings, however, when spread are found to be nearly transparent and of a ruddy-brown tinge. The pronotum is black with pale anterior border. Elytra and wings are fully developed; the former have a pale line along the anterior part of the costal margin. Length of male is about 14mm., of female 14·5mm. to 18mm. It was first recorded for Britain apparently by Burr ("Ent. Mo. Mag.," 2nd ser., viii., p. 14), Mr. H. L. F. Guérmonprez having sent him one of two, taken in a house at Bognor, and supposed to have been imported from Madeira in bananas. In 1897 (April 15th) I received two—an imago and a nymph—from Kew Gardens, and in 1898 (June 9th) I received another nymph from the same place. No further notices of the insect appeared till 1904, when on October 17th, the species (found breeding amongst turfs at Fallowfield, Manchester) was exhibited at the meeting of the Lancashire and Cheshire Entomological Society. The same year, on December 30th, one was caught in Liverpool Docks, apparently introduced amongst grain from San Francisco. In 1906 a specimen was caught in the market at Bradford, Yorkshire. In 1907 it was found to be firmly established in a hothouse in Lister Park, Manningham. By the same year it was breeding and had become abundant in the Tropical Houses at Kew Gardens. In 1909 I received one found crawling about on Christmas Day in a hot-house at Bishopstoke, Hants. One would gather from this that the date of first appearance of *L. surinamensis* in Britain was just prior to 1897. However, Prof. Westwood's Economic Cabinet in the Hope Museum at Oxford carries the date back at least till 1868. Specimens there are credited with eating plants and stove fruits in house (April, 1868) and destroying orchids (March, 1869). There are also some specimens and an undated letter to Prof. Westwood, asking for name and for advice as to getting rid of insects from a pine-house. The writer, referring to a trap, says:—"I have in this manner destroyed tens of thousands, and yet at this moment the plunging material is literally *alive* with them." *L. surinamensis* is a cosmopolitan species, found at least in Britain, Paris (Jardin des Plantes), Mexico, British

Columbia, Senegal, Java, Philippines, Burma, Amoy, Cayenne, Martinique, Central America, Brazil.

Quite a number of species of Cockroaches have occurred in Britain casually. Those mentioned below probably do not exhaust the list. It is quite possible that in some cases the identification is not absolutely reliable.

Nyctibora holosericea, Kl.—One taken at Covent Garden, July 6th, 1897, figured in "Entom.," 1900, p. 3. Probably an immature specimen of the same species, brought to Mr. W. Daws of Mansfield, April, 1908. One captured at Kew, June, 1904. One from Ship Canal, Manchester, exhibited at Lancs. and Ches. Ent. Soc., March 19th, 1906.

Nyctibora brunnea, Thunb.—From Bradford Market, Yorkshire ("Naturalist," March, 1909, p. 113).

Blatta melanocephala, ?.—Exhibited at Entom. Soc. Lond., April 5th, 1869, as having been found destructive in orchid-houses in this country ("Ent. Mo. Mag.," 1869, p. 302) [=? *L. surinamensis*, W.J.L.].

Stylopyga decorata, Brunner.—One, Worksop, March 20th, 1902. One, Nat. Hist. Museum, November 16th, 1907—so named by Kirby; but Burr calls it *Dorylea rhombifolia* (see "Proc. Ent. Soc. Lond.," November 20th, 1907).

Rhyparobia maderæ, Fabr.—This species often occurs, but always casually. There is no suspicion of its becoming naturalised. Captures have been too frequent to enumerate.

Blabera gigantea, Linn.—This very large cockroach, called the "Drummer" in the West Indies, has been taken in Liverpool Docks ("Entom.," 1899, p. 139), West India Docks ("Entom.," 1896, p. 164), and at Bradford in Yorkshire ("Naturalist," 1897, p. 26).

Blabera cubensis, S.—Two at Oxford, August 16th, 1906, and September 2nd, 1906 (A. H. Hamm).

Panchlora exoleta, Klug.—Three instances have been noted:—one at Coalville, Leicestershire, June, 1902; one at Maxwelltown, Dumfries, 1902; and at Mansfield, Notts, October 25th, 1906.

Panchlora nivea, Linn. (= *P. virescens*, Thunb.).—(1) Liverpool, exhibited at Lancs. and Ches. Ent. Soc., March 21st, 1904; (2) Leyland, exhibited at Lancs. and Ches. Ent. Soc., October 17th, 1904. (3) Manchester, from bananas, one in November and one in December, 1905. (4) Two, Manchester Ship Canal Docks, November 21st, 1905. (5) Warrington, Lancashire. (6) Hoylake, Cheshire, August 9th, 1906. (7) Warrington, November, 1907. (8) One exhibited at Entom. Soc. Lond., May 6th, 1908 (the last probably).

Panchlora viridis, Fabr.—Liverpool, exhibited at Lancs. and Ches. Ent. Soc., March 21st, 1904; occasionally imported into Edinburgh (Evans); Romsey, May 3rd, 1901. (Of the last two the identification was somewhat uncertain.)

Epilampra burmeisteri, Guer.—One November, 1905, and one January, 1906, from the Ship Canal Docks, Manchester.

Ischnoptera natalensis, Wlk.—One imported to Kew Gardens.

Nauphoeta brazzæ, Bolivar.—Four imported into Kew Gardens, October 18th, 1898. (Figured in "Kew Wild Fauna and Flora," VI.)

Nauphoeta cinerea, Oliv.—One imported to Kew Gardens, April, 1901. One exhibited at S. Lond. Ent. and Nat. Hist. Soc., September 9th, 1909, as *N. circumvagans* by H. Main—no doubt this species. (Figured in "Kew Wild Fauna and Flora," VI.)

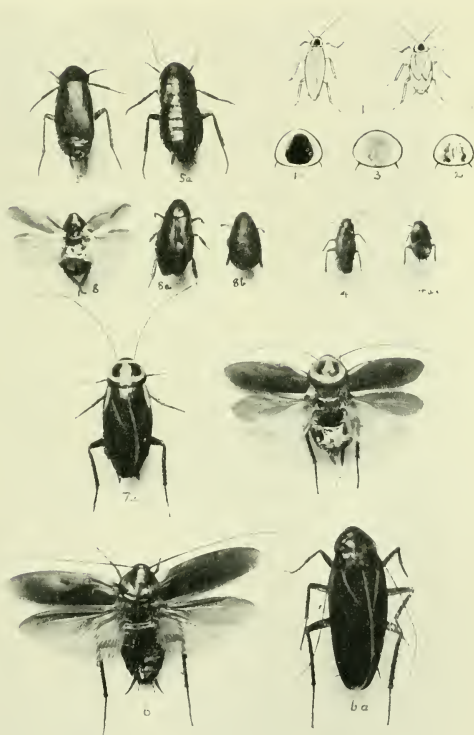
As there seems little likelihood of any of these casuals establishing themselves in the British Isles, their occurrence here is quite unimportant, and their names should not be added to the list of our Orthoptera.

EXPLANATION OF PLATE III.

COCKROACHES.

1. 1a. *Ectobius lapponicus*, L., ♂ and ♀ (nat. size).
1b. pronotum ($\times 4$).
2. *Ectobius panzeri*, Steph., pronotum ($\times 4$).
3. *Ectobius perspicillaris*, Fuess., pronotum ($\times 4$).
4. 4a. *Blatta germanica*, L., imago and nymph (about $\frac{2}{3}$ nat. size).
5. 5a. *Blatta orientalis*, L., ♂ and ♀ (about $\frac{2}{3}$ nat. size).
6. 6a. *Periplaneta americana*, L., wings spread and wings closed (about $\frac{2}{3}$ nat. size).
7. 7a, *Periplaneta australasiæ*, Fabr., wings spread and wings closed (about $\frac{2}{3}$ nat. size).
8. 8a. 8b. *Pycnoscelus surinamensis*, L., wings spread, wings closed and nymph (about $\frac{2}{3}$ nat. size).

PLATE III.



Photos by W. J. Lucas.

COCKROACHES THAT BREED IN BRITAIN.

Limacology.

By ALFRED SICH, F.E.S. (*Member of the Conchological Society of Great Britain and Ireland*). Read November 11th, 1915.

Slugs belong to the Phylum Mollusca and, I think, that is all I am going to say about the place they occupy in the scheme of nature which man, the scientific animal, has propounded. If we wish to study slugs we can go out into the garden, a space often rich in various forms of land mollusca, in spite of the care we take to exterminate them. The fields, lanes, woods, and hill sides, as well as river banks, are also profitable hunting grounds. By turning over stones, logs of wood, dead leaves in damp places, and by various other methods, which each ingenious limacologist or slug-hunter will invent for himself, we can find, take home and get well acquainted with several species. Then we shall wish to know more about them, to talk about them to others and possibly even to write about them. When we have arrived at this stage it is opportune to think about books, for we shall desire to know what the other slug-hunters call that small grey one, that solid black one, or that long yellow one, that we have become so well acquainted with.

Some years ago, when I reached this stage, it was no easy matter to find a book that would give the desired information, as some of our species were little known and there was great confusion of names, even in our own country. Now the condition of things has certainly improved, for all our known species are firmly established and there is a tacit agreement in the use of names. For the benefit of those who know nothing of slugs or snails I will mention two modern books, which have been of the greatest use, and I am very much indebted to the authors of them. Mr. Lionel E. Adams has written the "Collector's Manual," a book convenient to take on a holiday and containing an excellent account of our land and fresh-water mollusca, especially the slugs. The other is the volume on slugs in Mr. John W. Taylor's "Monograph." Here we have beautiful coloured figures of all the species, and maps showing their distribution, together with full details of the anatomy, habits and varieties of our slugs. Armed with these two books the tyro slug-hunter will be able to increase his knowledge to a wide extent. It is in the books that we can find the family, sub-family, etc., to which our various slugs belong. The slug itself does not know in the least whether it belongs to the cattle on account of its horns, or

to the serpents by reason of its mode of progression, and if it should know I do not think it would care one jot. What the slug does care about is the newly planted lettuce, the seedling aster, or that nice fungus in the wood. In the popular idea the slug is a loathsome creature, without beauty, without intelligence, but of exceedingly lazy habits and great keenness of appetite. Like many popular notions and many scientific theories, parts of this idea are wrong. The slug has a healthy appetite, its progress is slow, but it has great intelligence and certainly distinct claims to beauty. When we lift up a stone off the rock garden, or move a log of wood which has been lying on the ground for some time, we may see some slugs beneath. They will of course be resting, and, if we are curious, we try to make them move, and after a time they slowly creep off, and we think what dull animals they are, but we forget that we have come upon them suddenly in their sleep. One day I brought in four specimens of *Arion circumscriptus* from the garden and put them in a saucer with a little water. They soon began gliding all over the saucer, and I had some difficulty in keeping them off the table. Their motions were really quite graceful. One of these I made crawl up and down an artist's paint brush handle. After a time it got tired of its promenade and suddenly let itself down by a thread of slime on to the table, just as a lepidopterous larva would do on its silken thread. This habit of escaping from uncomfortable positions by means of a mucous thread is common to most slugs. For the larger species we require a soup plate or even a meat dish. Our soft friends glide easily over the smooth surface of such articles, and one can watch their actions and appreciate their form and proportions. Some species are more slender in form than others and some have much longer tentacles in proportion to their bodies than other species.

When first becoming interested in slugs one naturally has to overcome an inborn feeling of repugnance, but in this case, as in many others, familiarity breeds contempt and we soon learn to enjoy the grace and delicacy of the slug. Round London they are mostly of a dull coloration, but in some parts of the kingdom specimens may be found showing a scheme of beautiful tints. One disadvantage connected with the study of slugs consists in the want of any good method of preserving specimens for comparison. They look very sorry objects when immersed in spirit. They might perhaps keep their shape and colour better in a 10% aqueous solution of formalin. At present a water colour drawing would seem the best means of bringing back to memory the details of form and colour of any particular specimen of which we may wish to make some record. Mr. Main has made some very successful camera studies of these animals. A good series of such photographs would be a useful and beautiful addition to any conchologist's collection. In general slugs are of nocturnal habit, and require a large amount of moisture to keep them in a healthy condition. A dry heat is

quite fatal to them. When staying in the south of France, in 1904, I often noticed small elongate patches on a very high wall exposed to the hot rays of the morning sun. On examination one day these proved to be dried remains of slugs, and later I found some specimens in a moribund condition. It seems possible that these slugs had commenced to climb the wall while the lower part was in shade and on reaching the hot part the heat dried up the mucus and prevented their further progress. I have seen slugs on a sunny wall in Chiswick which had met with a similar fate. In wet weather, or in damp shady places, especially in autumn, slugs may be found feeding in broad daylight, but it is the shades of night that they specially delight in. They have many times been observed at sugared trees, and, like *Pyramis atalanta*, they may be found at fallen fruit, though they prefer to dine late. The life-history of a slug is as far as is known comparatively simple. The individuals are of both sexes when in their prime, but it is stated that some species commence life in a unisexual condition, then develop into a bisexual state, and finally become again of one sex, but of the opposite one to that in which they began life. After pairing the animals lay eggs, which produce young slugs. These at once look after themselves, and in due time become mature. The general opinion seems to be that they require from twelve to eighteen months to reach maturity, and may then live a few years. In order to get well acquainted with them it is a good plan to keep them in a large tin box such as grocers use for biscuits. Fill the box half full with earth, on this we can lay lettuce leaves, a piece of bread, or a slice of carrot, or apple. The cage must be kept quite moist and should be well aired every day. From time to time the animals should be placed in a second box, with fresh earth, so that the first box can be thoroughly cleaned. By keeping them in this way and allowing them to glide over a soup plate occasionally, we can get a very good mental picture of the different species, and thus become able to recognise them when we meet with them, much in the same way as an entomologist will recognise *Apamea secalis (didyma)* in its various forms. All our species are well recognisable in their typical forms when adult, but they vary considerably in colour and to some extent in marking, especially when immature, so that in many cases very great care is required in their identification. A white form is known of many species, and it would be highly interesting if one could bring white specimens of all the species together at the same time. One could then more easily appreciate the differences of form and proportion in each species.

It is not needful now to go into any technicalities, but it may be useful just to indicate a general idea of a slug, as it will help afterwards when the different species come to be mentioned. The body is subcylindrical. The flat part on which the animal crawls is known as the foot-sole. Lying on the top of the anterior portion of the creature is the mantle or shield, which covers the heart and the

lung, or breathing chamber. From the posterior margin of the shield there sometimes runs a keel along the back down to the tail. In front of the shield lies the head. This is mostly all we see when the slug is at rest. When active it thrusts out the tentacles, the upper pair bearing eyes on their summits and olfactory nerves, the lower pair being smaller and destitute of eyes. At the edge of the mantle on the right side of the animal we see the large aperture of the breathing chamber, this may be opened or closed at the will of the animal. There is no aperture on the left side except in sinistral specimens, which appear to be extremely rare. The shell slugs, of which we have three species, may be recognised from all the others by the small shell which they carry near the end of their tails. The heart and the opening of the breathing chamber are also situated in this part of the animal. They are strictly carnivorous, feeding chiefly on earth worms, and, like their prey, they pass a great deal of their life under the surface of the earth. Though stout when at rest, the shell slugs can elongate their bodies in a surprising manner, so that they can follow the worms into their burrows, and if they carried the mantle on their backs like the other slugs it would get in the way.

You will no doubt remember a splendid exhibition of *Testacella haliotideia* made by Mr. West, of Ashted, in this room some time ago. This species was the first known of the shell slugs, it having been discovered near Dieppe, in 1740. It appears to be fairly well distributed over England. It may be known by its whitish-cream colour and particularly by the lateral grooves being distinctly, but not widely, separated at their origin in front of the shell. These two grooves run from the shell along the body of the animal. When hungry they will seize the end of a worm protruding from its hole, and when the worm thus roughly treated retires, it is said, that the slug elongating its body allows itself to be drawn down the hole with its victim, thus obtaining food and cover at one fell stroke. Those I had did not always wait to get the end of the worm, but would seize it in the middle and slowly engorge it while the two ends were moving about. It was certainly a gruesome spectacle to behold.

In 1823 G. B. Sowerby discovered *Testacella scutulum* in a garden in Lambeth, but for many years it was generally considered only a variety of the last species, as its anatomical differences were then not known. From the last species it may be separated by its tawny colour and in the grooves which join together in front of the shell. I have sometimes found this species on the garden path or at the foot of a wall, but more often under logs or by chance when digging. It is usually covered by an earthy coat, and its ochreous colour is not well seen till this is removed. It was this species that Tapping described as *T. medii-templi*, having found it in the Middle Temple Gardens.

The third species, *Testacella maugei* is named after M. Maugé,

who discovered it in Teneriffe in 1796. It differs from the other two by its large shell. In the other two the shell is more or less flat and shield-like, but in *mangei* it is convex and shell-like. Then again the lateral grooves are widely separated when leaving the shell. The animal is generally of a brown colour, paler at the sides. Mr. Taylor shows by the internal organisation of this species that it is the most primitive of our three species, and that its chief home now is along the western coastal regions of Europe.

We now come to the slugs proper, which are chiefly vegetable feeders, though many of them will eat animal matter when opportunity offers. Of these we have two distinct families, the *Limacidae* and the *Arionidae*. In the former the opening of the respiratory chamber lies behind the middle of the margin of the shield, while in the Arions the opening is situated in the anterior of the margin just before the middle. This is perhaps the most obvious distinction, but there are other points in which they differ both in their external and internal organisation. *Limax* has a thin but distinct shell which has been found in a fossil state. While *Arion* only has a few calcarious granules, but even these have been reported as found in the Pleistocene beds.

Limax maximus is a fine animal, reaching a length of five inches or more, generally of a brownish or yellowish grey with dark lines or spots. The shield is also marked with irregular black spots. The dorsal keel is not prominent except towards the tail and the foot-sole is unicolorous. Like the other slugs, it may be found under logs and stones, but from its large size it requires a more extensive shelter than the common garden slug. When coiled up it has reminded me of a small snake. When at rest it often has the upper pair of tentacles just protruding, as though it slept with half an eye open. Its favourite habitat seems to be old gardens or meadows near farms. It shows itself to great advantage when gliding over a large meat dish. We can then note its long and slender tentacles.

If size and beauty were regal qualities then the next species, *Limax cinereo-niger*, might be called the "King of European slugs," as it is said to reach over a foot in length, and is often brilliantly coloured in southern Europe. The form most often occurring in Britain is blackish with a dull yellow keel running along the back to the tail. It may be known from *L. maximus* by the foot-sole being longitudinally marked by a pale band down the centre, while this is bordered on each side by a distinctly darker tint. The shield is generally unicolorous. It is not a common species, and seems to be of a wilder and more hardy disposition than the last, preferring open hilly country, such as Yorkshire and North Wales. It has, however, occurred in Sussex and as far north as Sutherland in Scotland. Near London it has been taken at Burnham Beeches and in Epping Forest. It will be remembered that Mr. Priske exhibited a nice example from the latter locality at our last meeting. I have seen them in Switzerland and the Tyrol. A very fine speci-

men of this species would be too large for a meat dish but might be able to display itself in a large sponge bath.

If we find a small bright yellow slug, with blackish tentacles, enjoying a fungus in a wood, we shall possibly be correct if we assume that it is *Limax tenellus*. Mr. Oldham exhibited some specimens here some time ago, and kindly gave me some to take home. I found them very lively and agreeable pets. Until a few years ago this species was scarcely known in Britain, but now that its characteristics and habits have been pointed out, it has been found in several places. Near London it occurs in Epping Forest. On the continent, where it is better known, it appears chiefly to inhabit the pine forests, where I have seen them gathered about fungi in damp corners. The young are said to lead a subterranean life, feeding on the mycelia of fungi. When in autumn the toadstools appear above the ground these slugs, then fully grown, follow them. They appear to live through the winter, but the autumn is the best time to look for them.

We have another yellow species, *Limax flavus*, but this is duller and much larger than the last. It is usually four or five inches in length and has bluish tentacles. I once found a giant of this species at Chiswick, which measured ten inches. It is very common about old houses, in cellars and gardens, so long as they are sufficiently damp. Several of them may be found together. I had occasion one night to visit a shed where there were some brewer's grains. When a light was turned on these it revealed a large family party of *Limax flavus*. They were of various sizes, and all very busy feasting on the wet grains. It causes a very unpleasant feeling if one accidentally treads on one of these large slugs in the dark, but of course it is still more uncomfortable for the slug.

Perhaps the most beautiful of all our species is *Limax arborum*. When in perfection it looks more like a delicate marine creature than a land mollusc, but it is really so fond of water that it may be considered amphibious. It is found on trees and rocks, and appears happiest when lying half immersed in a pool of water collected between the branches of a beech tree. Many old beeches have depressions, where a branch leaves the trunk and the rain turns these into aquaria. Here we may find *Limax arborum* resting on a carpet of soaked leaves, sometimes quite under the water. It is two or three inches long, of a delicate bluish- or even greenish-grey. The skin is very transparent, so that some of the internal organs may be seen through it. The shield is usually marked by a dark band along the margins. In spite of its delicate aspect it appears to be a hardy species. Taylor states that it is found from Iceland to Teneriffe. It occurs on hornbeams at Epping Forest. I have seen it in Devonshire, but have found it most plentifully and in great variety in the old beech forests on the continent.

We now come to the most abundant European slug which everybody knows, *Agriolimax agrestis*. The old books used to make me

cross, because they stated that, "This species is so well known it needs no description." One was therefore unable properly to identify it. It is a small slug of a pale ochreous or pale brownish colour, without any banding, but often spotted with darker brown. Its shield is concentrically wrinkled and its slime is milky white. We shall soon see the chalky slime if we handle the little animal. It is found almost everywhere, in gardens, fields, lanes, on the hill-sides, and at all times of the year. The animals are very prolific and the eggs may be noticed in damp places all through the year. This is naturally the first species with which the young limacologist will become well acquainted and of which he will obtain his first mental picture,

Its congener, *Agriolimax laevis*, may be known by its chocolate colour, its glossy appearance, its large shield, and long neck. When crawling, the shield appears almost in the middle of the animal instead of decidedly on the anterior portion as in other slugs. It is not a garden species but delights in very wet situations, such as the sides of ponds or canals. By day it may be discovered hidden among the roots of plants at the water's edge. It is exceedingly active and a very entertaining species on the saucer. It is worth mentioning that a snail, *Zonitoides nitida*, whose shell is of somewhat similar shining brown colour, is nearly always found where this slug occurs. Both these may be taken by the banks of the Thames at Kew.

The genus *Milax* is characterised externally by the grooved body and shield and by the prominent keel along the back. We have two species. *Milax gagates* is generally here of a leaden-grey coloration. Its strong keel, which is well marked right to the tail, is either unicolorous with its body or of a still darker tint. In the Mediterranean region this slug appears often to be of a jet black, hence its name. It is one of the less common species, but from its retiring habits it is probably often overlooked. Mr. Main sent me a fine specimen from Woodford and Professor Cockerell has taken it in Chiswick, though the writer has sought it there in vain.

On the other hand the second species, *Milax sowerbii*, is a common animal in Chiswick and the surrounding country. Both species, however, appear to be absent from the north of Scotland. *M. sowerbii* is larger and stouter than its congener, the keel, which is more prominent on the back and dwindles towards the tail, is generally of a lighter colour than that of the body. The rugæ or tubercles of the body are marked off by dark lines. It is grey with yellowish areas. It is thus a variegated slug, while *M. gagates* might be described as self-coloured. It is common especially in gardens under the more deeply buried stones, larger logs, or along the bases of walls. It is perhaps the most lazy of the whole tribe and it requires sometimes a lot of coaxing to make it display itself on the saucer. However, when it glides along its quiet and

harmonious tints, chiefly of blue grey and ochre, make quite a pleasing picture.

I have already mentioned the most obvious distinction between the Limaces and the Arions, but I might also call attention to the slime gland at the tail of *Arion*. This caudal mucus gland, as it is called, is absent in the *Limacidae*. Though the members of these two families are all slugs yet the families are widely separated.

The largest and best known of the Arions is the common black slug, *Arion ater*. It is a plump animal from four to six inches in length when crawling, and is covered with large elongate tubercles. It is fortunately common, so one often comes across it, and most country people know it as the "black snail," although it has no shell. It delights in damp fields, hedge-rows, woods, and ascends high up the mountain side. It varies a great deal. On the continent there is a brilliant red slug which some authors consider a form of this species. Though I have seen reddish *A. ater* in Scotland they are paler, smaller, and look different to the large red slugs on the continent, but perhaps the hotter summers and autumns abroad may account for the size and brilliancy of these latter.

The next species, *Arion subfuscus*, though much smaller than the black slug, is larger than the three other Arions. It reaches some three inches in length, has been much confused with the last species and is not always easy to separate. It usually has, however, a dark band running across the shield and along the body on each side, and a mixture of yellow in its coloration. It is one of those slugs which may be found on fungus in woods. I took it on one of our fungus forays at Oxshott, but have also taken it in company with *Agriolimax laevis* at the water's edge. There is a curious point about the distribution of this species. It has not, unless quite recently, been taken in the eastern counties. I believe it is not yet recorded for Essex and it would be interesting to find it in Epping Forest, a likely locality.

One of the commoner garden slugs is *Arion hortensis* and its sister species *Arion circumscriptus* may be found there also. I have sometimes seen them lying side by side under the same stone. They are both rather small, dark on the back, with a small dark band on each side of the shield and along the body. *A. hortensis* is slaty-grey with a blackish back and an orange foot-sole. All we have to do with typical specimens is to turn them over and see whether they are yellow or white underneath. They both display themselves well on the saucer but I fancy *A. circumscriptus* is the more lively of the two. The latter species is fond of fungus and may be found at Oxshott as well as in most places, though it has not yet been recorded from Epping where it probably occurs. *A. hortensis* also occurs in woods but its chief haunts are gardens and cultivated land.

The last and least of our Arions is *A. intermedius*, formerly known as *A. minimus*, a very small and delicate animal about three-

quarters of an inch long. It is usually of a yellowish-grey with very faint darker bands. It has one peculiarity which separates it from the young of other slugs with which it might be confounded. If, when we find it, it should be extended, we must try to bring it into the resting attitude and then, by holding it up to the light, we shall see that its back is covered with minute prickles. A lens will show these distinctly. It is as well to note the prickles in the field, as after we have had the animals in a box for some time they become inconspicuous. It appears to live chiefly on fungoid growth. I have found it on *Boletus* at Oxshott and among decaying oak-leaves in Richmond Park. It is probably common but requires looking for and has no doubt been passed over as the young of other species. The first specimen I took myself was at Torquay in October, and, wishing to take it back to our rooms, I put it in an entomologist's glass-bottomed pasteboard box with a few blades of grass. When I returned, in about two hours' time, the grass was in the box but no slug. There was a thin brownish patch on the side of the box and that was the dried remains of *Arion intermedius*. It is always better to carry slugs in metal boxes.

There is now only one more species to note. This is the strange Irish slug, *Geomalacus maculosus*. It differs from the *Arionis* in having a solid shell under the shield, but the respiratory orifice lies in the anterior portion of the shield and it possesses a mucus gland at the tail. It is rather a large slug, usually of a blackish hue with rather large pale yellow spots all along the back. The only specimens I have seen were exhibited in the Zoological Gardens some time ago. The peculiar coloration gives the animal an appearance quite distinct from any other British slug. This species is so very restricted in its habitat that unless we are prepared to visit the south-west corner of Ireland, where it was discovered by Mr. Andrews in 1842, we shall have little hope of making its acquaintance in a wild state. Outside Britain it occurs only in North-west France, north-west of Spain, and the north of Portugal. Mr. Taylor describes its favourite haunts in Kerry as being the much fissured rocks on the bare mountain-sides near the sea, where the atmosphere is kept warm and damp by the Atlantic mists. During the day these slugs mostly hide in the narrow fissures, but come out at nightfall to feed on the lichens growing on the rocks.

Having now given a few hints as to where to hunt for slugs, and how to study them, and having lightly touched upon all our known British species, I have only to add that the field of research, open to any who care to explore it, is still very wide. It would be, for instance, of high interest to obtain accurate life-histories of the different species by rearing them from the egg and noting the colour changes that probably take place during growth in all our species. Many problems of distribution and variation also await solution so that the young limacologist, starting from our present standpoint, need not despair of finding work nor of making discoveries.

British Crickets.

By W. J. LUCAS, B.A., F.E.S. *Read December 9th, 1915.*

On previous occasions I have read papers dealing with all the groups of the Orthoptera represented in Britain with the exception of the Gryllodea. To complete the series I have therefore prepared the following paper.

Four crickets are the sole British representatives of a group of insects which present not a few points of interest. Around one of them indeed—the house cricket—tradition has spread a halo almost of sanctity, though in real life the housewife or the baker do not regard it with the same degree of favour. Romance, however, sees with very different eyes when it looks upon the “Cricket on the Hearth,” about which novelists have written and poets have sung so freely.

We may define the **Gryllodea** as:—*Orthoptera with slender, usually long, antennæ. Elytra (at rest) with the dorsal part lying flat on the body, and the lateral turned down over the sides. Tarsi usually three-jointed; hind legs suited for leaping. “Ear” and “musical” organs situated similarly to those of the Locustodea. Female with a long exerted ovipositor (except in Gryllotalpidæ and Tridactylidæ). Cerci long. Many wingless forms.*

Seven families are usually given as comprising the Gryllodea:—

- | | |
|------|--------------------|
| W.* | 1. Tridactylidæ. |
| W.B. | 2. Gryllotalpidæ. |
| W. | 3. Myrmecophilidæ. |
| W.B. | 4. Gryllidæ. |
| W. | 5. Cæcanthidæ. |
| W. | 6. Trigonidiidæ. |
| | 7. Eneopteridæ. |

In Britain we have representatives of two families only. Three of our four species fall into the typical family—*Gryllidæ*—the remaining one into the *Gryllotalpidæ*. Western Europe has a far more representative list. Two of the British crickets occur in Scotland, whereas but one of the nine Locustids has been recorded from the Northern Kingdom.

As far as we know crickets seem to be somewhat general feeders, though perhaps with some at any rate the proclivities are rather

* W=represented in western Europe; B=represented in the British Isles.

towards food of an animal nature. In most cases there is an ovipositor (sometimes of considerable length). The first and second families, however, form an exception to this rule; members of the second also possess short antennæ. The *Gryllotalpidae* live underground, and consequently in them we meet with another peculiarity in structure—their forelegs are so modified as to become efficient digging organs, resembling quite noticeably those of the “mole” itself. The faculty of “singing” is well developed, and our four species are adepts at the art, but other members of the Grylloidea leave them far behind. As with the rest of the Orthoptera, there is little post-embryonic development.

Popular names have been given to our four crickets, which in most cases probably does not so much mean that they are well-known, as that they are sufficiently distinct from one another, to make a common name possible. So little resemblance is there in fact that an identification-table is scarcely necessary. The following artificial one is, however, given:—

- A. Ovipositor exserted; fore-legs normal.
- (a) Spines of hind tibiæ long, slender, moveable; first segment of hind tarsi not serrate; species dark brown, small *10mm. *Nemobius sylvestris*.
 - (b) Spines of hind tarsi strong, fixed; first joint of hind tarsi serrate on both sides, species larger.
 - 1. Very dark and bulky . . 23mm. *Gryllus campestris*.
 - 2. Greyish - brown; less bulky 18mm. *Gryllus domesticus*.
- B. Ovipositor not exserted; forelegs modified for digging; size very large . . 45mm. *Gryllotalpa gryllotalpa*.

Nemobius sylvestris, Fabr. (The Wood Cricket). This interesting little cricket is distributed all over Central Europe, and is found in North Italy, Spain, and Algeria. In Britain there appear to be but three localities—the New Forest, where it is very common (W.J.L.); Parkhurst Forest, in the Isle of Wight (F. Morey); and Bordwood, also in the Isle of Wight (H. F. Poole). Wood Crickets are dark brown insects, with head still darker; the elytra are short and truncate; the ovipositor is long. In the New Forest they occur especially amongst dead leaves, and appear to like dry banks, or at any rate slightly rising ground. Burr says they are adult in June and July; but they certainly are also in August and September, and it is not at all unlikely that some individuals hibernate as imagines. Small nymphs seem to be always in evidence. *N. sylvestris* takes short leaps of some nine or ten inches, but it also runs rapidly, though by fits and starts, and so is not easily secured. If much disturbed it soon hides amongst the dead leaves and vegetation. Specimens kept in captivity ate leaves of *Pyrus torminalis*,

* Average length of the female from the front of the head to the base of the ovipositor.

banana. bread (readily), raw beef (readily), cheese (not readily), rose leaves (a little), nasturtium leaf (not at all).

Gryllus campestris, Linn. (The Field Cricket). With the exception of the extreme north, this cricket occurs throughout Europe; it is also found in Algeria, Egypt, and Asia Minor. In England it is very rare, though, owing to its retiring habits, it may not be quite so rare as it is considered. Stephens gives Windsor, New Forest, Devon, and Cornwall as localities. Mr. C. A. Briggs has a male obtained at Bennett's sale in 1891. C. W. Dale had four specimens which his brother took at Christchurch in 1885. It was given as rare in North Staffordshire (Garner's "History of Stafford, 1844"). In December, 1899, Rev. E. N. Bloomfield gave me a male (taken at Pett in Sussex in 1899), which was discovered by its shrill voice, and was found on lifting a slab of wood in a bathing-shed on the beach. It was said to have been in a hole beneath the slab. This was the only specimen, and Mr. Bloomfield had seen no other. In 1901 I received from Major R. Robertson a nymph taken at Pokesdown, probably during the previous year. Two other records are Rotherhithe, in Surrey, 1904 (H. Moore), and Norfolk (J. Edwards). *G. campestris* may be known by its large size and very dark colour; the elytra, however, are brownish. The nymphs are shining black. The field cricket should be sought in hot, dry, sandy places from May onwards. It is easily kept in confinement, but is pugnacious and very noisy. Burr has found that it will eat lettuce, paper (!), sugar, and meat. The male sits at the mouth of its burrow in the sand and chirps loudly. Its cry is said to become sharper before rain. If the holes can be found, inserting grass stems in them, we are assured, will lead to the capture of the inmates. Gilbert White, in his "Natural History of Selborne," gives an interesting account of the habits of the field cricket. A long-winged form occurs rarely. There is such a specimen in the Hope Collection at Oxford, which Burr, however, thinks may possibly be *G. bimaculatus*, De Geer.

Gryllus domesticus, Linn. (The House Cricket).—What was the original habitat of this insect is uncertain, but perhaps it is wild in North Africa. In Britain it is seldom found out-of-doors, but prefers houses, bakeries, and similar places. There, owing to artificial conditions of warmth, specimens at all stages of growth are found living together—they have lost touch with the seasons, as have our resident alien cockroaches. Possibly they are becoming less common with us, and it may be that the cockroaches are driving them away. Gilbert White speaks of their migrating with undulating flight. The House Cricket lives on refuse and rubbish, especially sweet-stuff (Burr); it eats bread; moisture is necessary to it, which may perhaps explain its reputed liking for damp linen. Burr states that in Belgium it occurs in the steam-heated neighbourhood of underground pumps. Examples with abbreviated wings are occasionally obtained, but Brunner says he has heard of

this form only from Egypt. To give here a long list of localities for the House Cricket would be superfluous; a few outlying ones only will be mentioned. About 1898 a colony appeared on a moor near Paisley—a dumping-ground for rubbish from Glasgow—but the winter killed them (A. M. Stewart). They occur in mills and bakehouses in Paisley (A.M.S.). A female was taken at Kilbarchan in Renfrewshire (A.M.S.). A number, of all ages, were found in an old quarry west of Slateford, near Edinburgh, on the evening of June 25th, 1907; they were under rubbish, old clothes, etc., and were no doubt introduced with them (W. Evans). Belleisle (Fermanagh) and Coolmore (Donegal) are given as Irish localities (S. W. Kemp). It has been recorded for the Isle of Man from Laxey, 1902 and 1904, and from Ballaugh, 1904 (R. T. Cassal). It occurs in Houses in Guernsey (Luff).

Gryllotalpa gryllotalpa, Linn. (The Mole Cricket.) Throughout Europe, from Sweden to Spain, the Mole Cricket may be found. It is common in France, where it often does harm in gardens by destroying roots. In Britain it is local, being found chiefly in the south. Stephens gives Devon, Cornwall and Ripley as localities, but several others have been recorded. *Berks*—Besselsleigh (W. L. Distant). *Cornwall*—St. Enodoc, near St. Minver, 1912 (C. W. Bracken). *Derbyshire*—Side of canals (Glover's "Hist. of Co. of Derby," 1829). *Devon*—(Bignell); near Exeter (Parfitt). *Hants*—New Forest (W. J. L.); Netley (C. A. Briggs); Southampton (D. Sharp). *Kent*—Lower Road, Deptford (H. Moore). *Lines*—Grimsby, 1902 (G. Hicks). Near Manchester (M. Jacoby). *Norfolk*—Stoke Holy Cross (J. Edwards). *Oxon*—near Oxford (J. W. Shipp). *Staffs*—near Birmingham (Garner's "Hist. of Co. of Stafford, 1844). *Sussex*—near Chichester Canal (H. Guernonprez). *Surrey*—Churt, 1901, and Milford (G. Dalgliesh). I have a record for Scotland—one in 1899, from Kilmalcolm, in Renfrewshire (A. M. Stewart.) A single one, in the Natural History Museum, Dublin, was found on the bank of Lough Neagh, in the North of Ireland (Scharff). It occurs in Guernsey (Luff). The Mole Cricket lives in holes in damp places, in potato fields and similar localities, and also, it would appear, in sandy places. A long winding passage leads to a chamber in which the female lays about 100 yellowish eggs. The mother displays some amount of maternal solicitude, and Kirby and Spence speak of its defending the ova with its jaws against a black ground beetle. It is said that two years are passed in reaching maturity. The nymphs hybernate, and it would appear that the imagines may do so as well, for the Cornish specimen mentioned above was captured towards the end of December. *G. gryllotalpa* feeds on roots and animal food when the latter is obtainable. In captivity specimens may be fed on potatoes, turnips, meat, etc. They should be kept separate from one another. Its stridulation, resembling the "churr" of the nightjar, may be heard at dusk on warm

spring evenings. The rare variety *cophtha*, Haan, with abbreviated wings, has been recorded from Brindisi in Italy.

One or two casuals may be mentioned :—

Myrmecophila acervorum, Panz. Burr gives a doubtful record for Salop. If correct, the species apparently is indigenous.

Homœgryllus reticulatus, Fabr. A female was found on 18th October, 1898, at Kew Gardens, in a case from the Belgian Congo State.

Gryllodes (prob. *hebræus*, Saussure). Several were taken by Mr. G. Massee, in the Jodrell Laboratory at Kew Gardens. Apparently they were breeding there.

Gryllodes sp. One found at Kew Gardens in a wardian case from Calcutta, 1899.

Gryllacris sp. A specimen found on *Nepenthes* in propagating pits at Kew Gardens, 6th October, 1897.

[**Œcanthus pellucens**, Scop. One was supposed to have been taken by Mr. Haworth, near Halvergate, in Norfolk. Westwood, however, after purchasing his cabinet, said that the insect had been misnamed. It appears now to be lost.]

The whole of the British Orthoptera have now been dealt with as follows :—

- 1912-13. Notes on Earwigs that breed in Britain. 2 plates.
- 1913-14. British Short-horned Grasshoppers. 3 plates.
- 1914-15. British Long-horned Grasshoppers. 3 plates.
- 1915-16. { Cockroaches that breed in Britain. 1 plate.
- { Crickets that breed in Britain. 1 plate.

EXPLANATION OF PLATE VI.

CRICKETS.

1. *Gryllotalpa gryllotalpa*, Linn.
Wings spread and closed (a little over $\frac{3}{4}$ nat. size).
2. *Gryllus domesticus*, Linn.
 σ and φ (a little over $\frac{3}{4}$ nat. size).
3. *Gryllus campestris*, Linn.
 σ (a little over $\frac{3}{4}$ nat. size).
4. *Nemobius sylvestris*, Fabr.
 φ ($\times 1\frac{1}{4}$ nat. size).

PLATE VI.



1.



4



2



3

Photos by W. J. Lucas.

CRICKETS THAT BREED IN BRITAIN.

The European species of the genus *Melanargia*.

By J. PLATT-BARRETT, F.E.S. Read January 27th, 1916.

My object in writing this paper is to propose a better classification of this interesting group of butterflies and to suggest that all the various forms spring from three "root-stocks." I have a friend, a poultry breeder, who holds an analogous opinion with regard to poultry, and who argues that all the various breeds can be traced back to three "root-stocks"—the Asiatic, African, and Mediterranean. At one time I attempted to reduce the *Melanargia* to one "root-stock," but could not work it out successfully to my own satisfaction. I think the idea of *three* is practicable.

I acknowledge with thanks the liberal help I have received from brother entomologists, especially from Mr. Rowland-Brown, who introduced me to Oberthür's valuable work, "*Lépidoptérologie Comparée*," and supplied me with information in addition. I am also grateful to Mr. Sheldon for specimens of *suwarovius* from Russia, to Mr. Durrant for ready help at the Natural History Museum, and to the following gentlemen for exhibiting valuable specimens of *Melanargia*: Mr. Curwen, Swiss forms; Mr. Frohawk, British yellow forms; Mr. Gibbs, *larissa*, also Balkan and Asiatic forms; Mr. Turner, Spanish and other forms (with notes); and the Rev. G. Wheeler, specimens of *lucasi*—including one wonderful var.

I prefer the generic name *Melanargia* = "black white" (Meigen, 1829) to *Argy* = "white" (Boisduval, 1832), but am unable to praise Meigen any further. He was an inferior artist and his figures compare unfavourably with those of Hübner, who flourished 30 years previously. He gives us eleven species: one is *electra*, quite a nondescript, and he completes the number with *leucomelas*, *procida*, and *galena*, all vars. of *galathea*. In Hübner's grand work on "Butterflies," published in 1805, he divides the *Melanargia* into ten species as follows:—(1) *galathea*, figs. 183-5. vars. 658-9; *lachesis*, 186-9; *clotho*, 190, 191; *atropos*, 192, 193; *amphitrite*, 194, 195; *thetis*, 196-7; *psyche*, 198, 199; vars. 677, 678, 694-7; *larissa*, 896-899; and *hertha*, 900-903. To complete the number of species he adds *leucomelas*, 517-518.

Hübner's letterpress is very short, but we can gather some valuable information from his synonyms.

<i>clotho</i>	= syn.	<i>Papilio argy</i>	Russicæ (Esper).
<i>atropos</i>	= „ „	<i>japygia</i>	(Cyril).

amphitrite = „ *arge* (Sulzer) *Siciliæ* (Esper).

psyche = „ *arge* *Occidanica* (Esper).

Later on Hübner discovered that *thetis* was a name already in use and adopted *ines* in its place—see “Illiger’s Mag.,” vol. III., page 205 (Hoffmansegg).

In modern times *clotho* has been replaced by *japygia*; *atropos* has been reduced from specific rank to *japygia* var. *atropos*; *amphitrite* has given way to *arge*; *psyche* is still retained by Oberthür (1909), but has been dropped by Staudinger and now stands in his Catalogue as *syllius*, Herbst, 1796; syn. *psyche*, Hübner 1799. I prefer with Oberthür to stick to *psyche*; *herta* has also disappeared from specific rank and Staudinger gives it *larissa* var. *herta*, H.G., 900-3; *pherusa*, Dahl., was given specific rank by Boisduval (1832), and has since been reduced by Seitz (1906) to *syllius* var. *pherusa*. I need not go into further details regarding the nomenclature of the *Melanargia*, only to give the names of the species we have to consider in detail. 1, *galathea*; 2, *lachesis*; 3, *japygia*; 4, *arge*; 5, *psyche* or *syllius*; 6, *ines*; 7, *pherusa*; and 8, *larissa*, and to draw special attention to the vars. *atropos* and *herta*.

MELANARGIA GALATHEA.

This species (*Papilio galathea*, Linnæus, 1758) is, of course, the first of the *three* root-stocks to be taken into consideration. I have exhibited my own English specimens (dating from 1859 to 1914), chiefly captured in Kent and Surrey, and (with one exception), there is very little variation amongst them. They are similar in size and in pattern, they all belong to the pale form of *galathea*, and agree with the type specimen of Linnæus. This form appears to be found in Belgium, France, and Austria, and as far South as the Rhone Valley in Switzerland (I may add here that Mr. Frohawk exhibited some English specimens showing a tendency to yellow in the ground colour). In the Swiss Alps (Berisal, 5,000ft.) the dark form *procida* is met with, while the darker form *turcica* occurs occasionally near the Simplon Kulm and also at Iselle in N. Italy. In Tuscany the local form that I captured there at 2,000ft. was *procida*, of small size, while in Southern Italy, alike at sea-level, Gioja Tauro; at 1,000ft., Monte Elie, Palmi; and at 2,000ft. above Scylla, the form is dark *procida* with occasional *turcica*, and there is a tendency to produce large females.

I should have liked to make further search in Calabria but was stopped doing so last year by the war. Seitz tells us that *japygia* var. *atropos* is found there together with the type form *procida*, and it is of smaller size. I should have liked to verify that statement, but I have nowhere met with *japygia* in Calabria, which is a very difficult country to work, as there is no decent sleeping accommodation in the villages, and long wearisome day excursions are a necessity. Good water is obtainable, plenty of food also, provided, as one traveller puts it, you take it with you. If you have not done so, you

will have to be content with bread (and this you may have to tramp miles to discover) and wine—which it is wise not to touch during sunshine, and after the day's work is over and a "pick-me-up" is needed—the traveller finds the wine is kept in such a foul cask, that when drinking it he must hold his nose to prevent the stink making him sick, and swallow the stuff at a gulp. Still it is good wine. Take Scylla as a typical hunting ground. From the station there is a most arduous climb of three to four hours up a narrow track in a gorge, in places washed entirely away, and then it is necessary to negotiate a mass of rocks and stones forming the torrent bed, the last hour through woody scrub, almost impassable in places. On the top of the hill a road is met with just before the wood ends, which serves the little villages on the plateau and leads nowhere, and it has no connection with the station down below. There are six inches or more of dust on the road which the tiny ox carts plough through and raise up in clouds. For more than a mile this road provides a shelter for *procida*, with occasional *turcica*, which congregate here in larger numbers than I have seen elsewhere. Close by are meadows which provide the necessary food-plant. When resting on the leaves of the undergrowth, *procida* is a black butterfly, but when disturbed the underside gives it a much whiter appearance than we expect. At intervals along the road tall *cosnus*-eaten trees attract crowds of *Vanessa* to the sap, and a collector has a lively time.

Upon crossing over to Sicily the entomologist discovers that *galathea* is of large size, some of the females extending to 60 centimetres. These specimens resemble a form which occurs in Algiers and has received the specific name of *lucasi* or *mauretanica*. Mr. Rowland-Brown has compared the two forms and has arrived at the conclusion that they are identical. Zeller named his specimens taken at Syracuse—*syracusana*, and therefore I should suggest the name *siciliana* for the Sicilian form of *galathea*, though I think the specimens vary a little in every gorge, where they occur in that island.

MELANARGIA LACHESIS.

I next turn to *M. lachesis*. I have exhibited one good variety of *galathea* taken in Kent by myself in 1875. It was figured by Newman in the "Entomologist" of 1877, described by my old neighbour, C. G. Barrett, in his "Lepidoptera," figured by Mosely of Huddersfield in his "Aberrations" (?), 1869, and Oberthür says he has seen similar vars. on the continent, and has given it the name "*mosleyi*," which I consider a meaningless one. I should prefer it to be called var. *lachesis*. In my specimen, the central black blotch is missing on all the wings. In typical *lachesis* this blotch is small on the forewings and missing on the hindwings and the basal black blotch is reduced to shading. Oberthür tells us that he knows that in the parts of France where *lachesis* occurs, *galathea* is not

met with, and *vice-versa*, and we are told that *lachesis* occurs in Spain, but *galathea* is absent. Therefore I suggest that *lachesis* is a sub-species of *galathea*.

I also suggest that var. *herta* is a sub-species of *procida* or *turcica* for exactly similar reasons.

MELANARGIA ARGE.

The second root-stock is of course *M. arge* (Sulzer, 1776). I own that Sulzer's locality for *arge*, viz., Sicily, puzzled me, for the Sicilian species is certainly *pherusa*. My attention has lately been drawn to "The Kingdom of the Two Sicilies," and on rubbing up my history and geography I have found that two centuries ago the Kingdom of Naples and the Island of Sicily were distinct. In 1736 the Neapolitans conquered Sicily and formed the kingdom of the Two Sicilies. The first Kingdom of Sicily included the southern part of Italy from Naples to Cape Spartivento, and Sicily formed the "Second Kingdom of Sicily." Naples itself was said to be in Sicily, and probably Sulzer's "type" specimen was from Sorrento. Though his figure is badly drawn, and he put on it far too much indigo, there is a slight resemblance.

Arge appears to be fairly well distributed in Calabria, and its "colonies" are generally found in sheltered spots on hurricane swept hills, where much grass grows. All the specimens that I have seen were over before *galathea* emerged, and I have never found them together, as *galathea* appears to prefer a lower level and more shelter. I have captured *arge* 100 miles apart, at Catanzaro on the mountains near the east coast, at Nicotera on the west coast, at Cittanuova in the great plain at the foot of the mountains, and above Scylla, two miles from the *procida* locality mentioned previously. In some instances, notably at Scylla, the specimens were worn, but I took no *galathea*. I took one worn var. approaching *ab. cæca*, the ringless form.

MELANARGIA PHERUSA.

With regard to *pherusa*, Dahl., which is common on a shelterless hill near Palermo, with its var. *plesaura*, where it has, so to speak, "to cling to the grass with its eyelids," I was late one season and found the specimens all battered to pieces. On leaving the hill early in disappointment, I reached a hollow where a stream rushes along after a storm, and there I saw a butterfly flying most awkwardly. I caught it, and it proved to be a newly emerged *galathea*—quite limp. This is the only specimen I found near Palermo, and concluded I was too early for it, as it is said to be common there. *M. pherusa* has recently been reduced in rank and now stands *M. syllius* var. *pherusa*, ab. *plesaura*, Seitz., 1906.

MELANARGIA PSYCHE = SYLLIUS.

I have had no personal experience of *psyche* (Hübner, 1799) =

syllius (Herbst., 1796). The plates of both these authors are excellent, and the figures supplied by Herbst., plate 183, figs. 3 and 4, closely resemble the type form of *pherusa*. Once more Oberthür has forestalled my opinion about these species when he writes in his "Lépidoptérologie Comparée," vol. iii., 1909, that "between *arge* and *pherusa* and *psyche* (*syllius*), such great affinity occurs" that he considers the two latter are geographical races of *arge*. In this view I quite agree, and I would go further and add *ines* to the group. This is a group where "crossing" might occur, but as I have no data to go upon I will leave this point for more experienced collectors to discuss.

MELANARGIA JAPYGIA.

The third root-stock is *M. japygia*, Cyril, whose figure (1787) is quite good, but his description does not assist us much. Hübner's figures—for he gives us two species—are excellent, (1) *clotho*, without a black band on the hindwings, and (2) *atropos* (synon. *japygia*, Cyril) with a small band. Oberthür supplies us with life-like portraits in his work, vol. v., part 1, plate 59, and with descriptions at page 315, etc. The specimens figured were captured at Avellino, not far from Naples, and are probably the descendants of Cyril's species. He gives normal ♂, upperside; and six ♀s underside, showing various small differences in the eye marks, one being asymmetric, another embryonic, and others varying in depth of colour. Besides these he has figured three specimens of var. *cleante* and one with no eye markings. He remarks that one space on the underside of *japygia* is usually free from a spot, and gives one specimen with a well defined spot in that space. Mr. Durrant has pointed out to me that Cyril's figure also shows a well defined spot there, and I find in my specimens that they differ—the largest number have no spot, a few have an embryonic spot, and another few a well defined spot.

The Sicilian form of *japygia*, which has been said to belong to var. *atropos*, Hübner, is a very fine insect, much larger than the figures given by him. The band on the hindwing is as well defined as that of *galathea*, so it is necessary to search for points of difference between them. For myself I separate the two species by the upperside of the forewing. In *galathea* the pattern is divided into three well defined portions, while *japygia* is divided into four. Seitz describes the difference thus:—"The forewing of *japygia* is crossed about the middle by a transverse line dentate like a saw." Oberthür has supplied us with a key from the underside of the hindwings, and has pointed out that the last nervure (next to the body) differs. In *galathea* it is shaped something like a Y, the upper half being duplicate—this is the case in *lachesis*, *procida*, *turca*, *herta*, and *incasi*, while in *japygia* the nervure is perfectly straight I without any doubling.

On the wing *japygia* is easily distinguished by its hurried flight,

and is met with at a higher level in Sicily than *galathea*, where, owing to the prevalence of high winds, it is more often seen than caught, and I wonder whether further differences in the nervures may be traceable in order to account for this difference of flight. Should the collector reach the *japygia* ground on a calm afternoon, a very rare occurrence, he will have a great treat, for the place is a "live" garden in two respects, and there, white and blue flowers and butterflies will recall our Union Jack, and alone in the wilds of the steep gorge he will feel patriotic. *Melitæa didyma* is the brightest red "flower," and suns itself in numbers all round. *Aglais urticae* and *Pyrameis cardui* settle on the mule-track, almost under his feet. *P. atalanta* prefers the tree-trunk close by; *Dryas pandora* and *Issoria lathonia* flit from flower to flower; *Pieris rapæ* and *M. japygia*, which show up white, settle quietly, but do not try to catch a specimen of the latter, if you do the whole batch hurries off down the slope where you cannot follow them; the blues, chiefly *Polyommatus icarus*, brighten up the blue and white flowers; *Papilio machaon* blunders along, while lovely *P. podalirius* soars over the tree occupied by *atalanta*, just out of reach. Night comes on quickly in Sicily, and it is dangerous to be caught by darkness on the steep slope full of pitfalls, so hurry down to the military road below; on your way you may pick the black burnet *Syntomis phegea* off the thistles, pass scores of *Adscita statites* flying over the *Erica*, and watch a batch of larvæ of *Malacosoma franconica* scattering for their evening meal. After passing the Cataract, a fall of about 50 feet, and having bid good night to the polite washerwomen who crowd to the stream, you feel safe, and wish for another calm day in the near future—a wish very seldom gratified until your coveted specimen is battered and worn-out.

MELANARGIA LARISSA.

I have no knowledge of *larissa* in its native haunts, but the specimens I have examined appear to me to belong to the *japygia* group. The pattern is divided into four, and the last nervure on the under-side is straight, not Y-shaped, the females are large, and altogether there is a close resemblance to the Sicilian form of *japygia*. The affinity is so close that I have no hesitation in suggesting that *larissa* is a geographical form of *atropos*, Hübner, and therefore *japygia*, Cyril. I may add that in the Natural History Museum Collection, there is a series under this name (from the Elwes Collection) which requires further examination, as it may be an Asiatic form.

SUGGESTED CLASSIFICATION OF MELANARGIA (EUROPEAN).

GENUS. MELANARGIA (Meigen, 1829).

SPECIES. (1) GALATHEA (Linnæus, 1758).

var. *procida*—dark.

var. *leucomelas* ♀ —pale u.s.

PLATE XII.

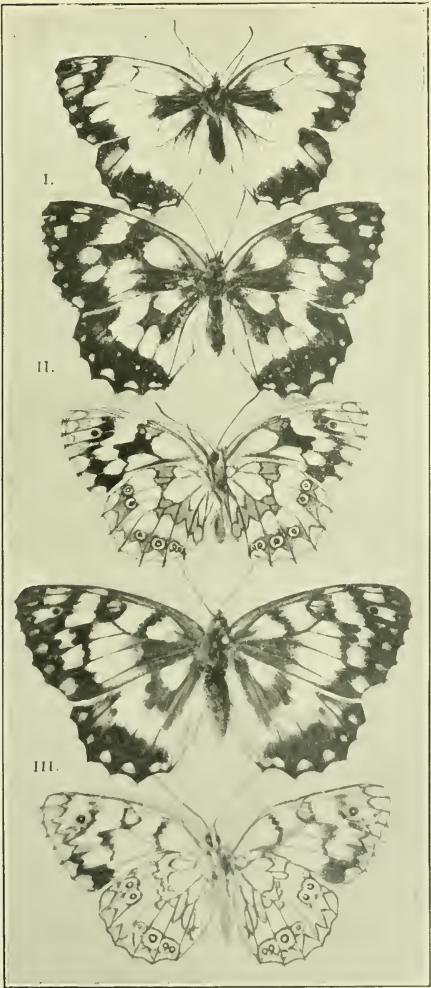


Photo. by G. T. Turner.

MELANARGIAS.

var. *turcica*—darker.

var. *galena*—no eyes.

Sub-species (a) *lachesis*—pale. France and Spain.

„ „ (b) *herta*—(central pale band). Balkans.

(2) *ARGE* (Sulzer, 1776). C. and S. Italy.

var. *caca*—no eyes, etc.

Sub-species (c) *pherusa*. Sicily.

var. *plesaura*—no eyes.

„ „ (d) *psyche*=*syllius*. Spain, etc.

var. *ixora*—no eyes.

„ „ (e) *ines*=*thetis*. Pyrenees.

(3) *JAPYGIA* (Cyril, 1787).

var. *cleante*. France, etc. (pale).

Sub-species (f) *atropos*. Sicily (dark).

„ „ (g) *suwarorius*. Russia, Hungary, etc. (pale).

„ „ (h) *larissa*. Greece (dark).

P.S.—The sub-species *lucasi* (Algiers) may be added to the *GALATHEA* Group, and *titea* (Syria) to the *ARGE* Group.

EXPLANATION OF PLATE XII.

The genus *Melanargia*.

- I. Upper-side of *M. galathea* var. approaching *M. lachesis*. N. Kent, July, 1875.
 - II. Upper- and under-side of *M. galathea* var. *procida*, from Messina, Sicily, May, 1910.
 - III. Upper- and under-side of *M. japygia* var. *atropos*, the Sicilian form, May, 1910.
- All captured by J.P.B.

The Autumn Butterflies at Eastbourne and some other notes.

By ROBERT ADKIN, F.E.S. *Read January 27th, 1916.*

The weather during the autumn months of 1915 was distinctly "patchy." In some districts rain was frequent, while in others for many weeks hardly a drop fell. For instance, while the neighbourhood of London was receiving a respectable amount of moisture, we at Eastbourne were longing for a decent shower to freshen up the parched gardens. We had plenty later, but that does not affect the present question. It was perhaps owing to this difference in weather conditions that the reports one heard of the scarcity, or otherwise, of the autumn butterflies arose, but apart from that there appeared to be a great difference in the relative numbers of what one usually considers the common species, even in the favoured districts. Why should *Aglais urticae* be rare while *Pyrameis atalanta* was more than common? They are species of similar habits and appear at practically the same time of year. Or why should *Polyommatus icarus* be less common than usual, while *Agriades thetis* (*bellargus*) was particularly abundant? But I am perhaps anticipating, and should give some details of what came under my notice rather than indulge in generalising.

The period under notice extended from the middle of July to the early days of November, but my opportunities for observation were by no means continuous, consisting as they did entirely of week-ends, sometimes of two, or at most three days, but more often of only one, and if that one happened to be cloudy, a full fortnight might possibly elapse between the times that I had any chance of watching the butterflies. The chief districts of observation were the flowery banks along the western part of the parades, the sea front of the Downs as far as Cow Gap, about a mile beyond, and my own garden, with very occasionally a walk over the higher Downs or through Abbot's Wood. It will perhaps be convenient to deal with the subject under the heading of species rather than in sequence of dates, although it may necessitate some repetition of dates and places.

Pieris brassicae and *P. rapae*.—White butterflies were fairly common during July, August, and September throughout the whole district, but at no time particularly abundant; they were, however, seen more commonly during the first fortnight of August than be-

fore or after, especially in the case of *P. brassicae*. Both species were last seen on October 3rd, when *P. rapæ* was still flying in some numbers, but *P. brassicae* was represented by only a couple of specimens.

Colias edusa was first seen on September 5th, when one was noted on the parade banks and another in Cow Gap. Others that came under notice were, on the 13th, 1; 17th, 2; 18th, 4; all on the parades, and the last on 19th, when one flitted about the flowers in my garden for a few minutes in the afternoon sunshine. So far as I was able to observe them, they were all males in more or less worn condition.

Gonepteryx rhamni.—On August 22nd I was not a little surprised to see a male example of this species flitting contentedly about some furze bushes right on the top of the Downs. I know of no *Rhamnus* growing in the neighbourhood, but the insect appeared to be in absolutely fresh order, as though only just out of pupa.

Brenthis selene.—A second brood was reported as having been on the wing in Abbott's Wood at the end of August, several being seen on the 22nd, and a few on the 28th, all appeared small in size as compared with those of the usual spring emergence.

Vanessa io also was reported from the same locality on the last-mentioned date as occurring sparingly.

Aglais urticae.—One was noticed on the parade banks on July 13th and another in a similar position on the 18th, but no more were seen until September 13th, when a couple were noticed along the parades, and on the 18th a few more. I have no note of it having been met with along the Downs and it was a rare visitor to the garden. Usually one may find several specimens feeding at the plants of *Sedum spectabile* that are grown in some of the flower beds near the sea, on any sunny morning in August or September, but although I visited them more than once, I failed to find *urticae* at them.

Pyrameis atalanta was first met with on August 29th, when, in the flower-bedecked open spaces about Abbott's Wood, specimens were frequent, but I did not detect it on the coast until September 13th, when only one was seen. From this time, however, it soon became more numerous, and from the 18th was one of the most commonly seen butterflies along the parades, was by no means infrequent along the Downs, and quite abundant in the garden, where it was the usual thing to see anything from a dozen to a score of individuals gorging themselves at the blossoms of the Michaelmas daisies at one time. A similar state of affairs continued until October 3rd, and there was little abatement in numbers on the 10th but on the 17th, a rather dull day, three was the largest number seen in the garden at one time. The weather during the week that followed was cool and rainy, and no more *atalanta* were seen.

Pyrameis cardui was at no time common. One was seen at Abbott's Wood on August 29th, a couple on the parades on Sep-

tember 18th, and on October 3rd, on a walk along the parades and the Downs as far as Cow Gap, perhaps half-a-dozen were seen.

Polygonia c-album.—September 18th was a brilliant day and a red-letter day for Vanessids. During the morning a stranger was noted among the *atalanta* that were feasting at the Michaelmas daisies in the garden, and on a net being procured and the stranger secured, it proved to be a very nice *c-album*. A second specimen was taken on the same or following day in a garden at Hampden Park, an outlying part of the town some two miles inland. So far as I am aware, Sussex was at no time a home of this species, not even in the early years of last century, when there appears to have been well-established colonies in some other of the southern counties, but stray examples have from time to time occurred, the last previous record, I believe, being one at Dormans, a village just on the Surrey border of the county, on September 11th, 1906. It would be interesting to know whence these stray individuals come: of course, there is always the chance of an escape from someone's breeding-cage, or the result of an attempt to acclimatize the species in the neighbourhood, a most unsatisfactory proceeding unless the fact is widely published, but on the other hand there is the possibility of a migration from some other place, in an endeavour on the part of the species to extend its range of distribution under natural conditions.

Epinephele jurtina (*janira*) was met with commonly throughout the district during July, August, and the earlier part of September, but thinned down towards the end of the month; the last seen was a solitary one in Cow Gap on October 3rd. During the earlier part of the time it was a frequent visitor to the garden.

Epinephele tithonus.—A few were noted on August 8th in Cow Gap.

<i>Ctenonympha pamphilus</i>	} Were all fairly common during the earlier part of the time and not infrequent visitors to the garden. The two latter were seen last on October 3rd.
<i>Rumicia</i> (<i>Chrysophanus</i>) <i>phlaeas</i> ,	
and <i>Polyommatus icarus</i> .	

Celastrina argiolus was fairly common in the garden and about the ivy-covered walls along the parades on August 2nd, but had decreased considerably in numbers by the 8th. The species did not appear at any time to be so abundant as in some recent years.

Agriades coridon.—It was not until August 8th that I had an opportunity of visiting the parts of the Downs where this species occurs, and I then found it very commonly, and as a rule the specimens were fresh. Little difference in numbers or their condition was noted on subsequent visits up to September 18th. Soon after this some unsettled weather set in, with a fair amount of rain and chilly northerly winds, and on my next visit on the 26th I failed to detect any, but on October 3rd, during a few hours' of hot sunshine and calm weather I found one undoubted female although no males were on the wing.

Agriades thetis (*bellargus*) was not met with until September 5th, on which day it was found very commonly in Cow Gap and had evidently been on the wing for some days. To see this species at its best one needs to be on the ground in the morning, as, soon after mid-day the sun begins to lose its power on the banks frequented by the butterflies, and early in the afternoon portions of the ground are in shadow, and a thinning down in the numbers on the wing is soon noticed, nor are the butterflies then to be found on the grass stems, but seem to have a knack of secreting themselves among the rooty parts of the thicker grass tufts and in all sorts of inaccessible places on the steeper parts of the banks. From the time when the species was first noted it steadily increased in numbers, and indeed appeared to be more abundant than in the past few seasons, and no diminution in numbers was noted throughout September. During early October there was a decided thinning down, but even then it was still to be found commonly, and many of the individuals of both sexes were quite fresh. It was last seen on October 17th, a beautifully fine, warm morning, when some three or four dozen were noted, and among them two or three of the males were brilliant in their freshness. Fine weather continued for a few days longer, and no doubt the species remained on the wing through them, possibly to the 20th or 21st, although the last that I actually saw of it was on the 17th. Tutt, in his "Natural History of the British Lepidoptera," devotes nearly four pages of closely printed matter to the earliest and latest dates on which *A. thetis* has been found on the wing; in these October is given only seven times, and the 15th of that month is the latest date mentioned. It therefore appears that even if the 17th, on which I saw it last autumn, was the last day on which it was actually on the wing, it was an exceptionally late date for the species.

From the foregoing it will be noted that *A. coridon* and *A. thetis* are flying together in this locality for two or three weeks, and have every possible opportunity for cross-pairing, yet I have never seen such an occurrence, nor have I ever come across any specimen that suggested in any way the possibility of it being a hybrid.

Before leaving the butterflies there is just one other point that I should like to notice. Many years ago when I used, as a youngster, to go to Eastbourne very occasionally for a day's collecting, a rough cart track ran from the end of Meads Street, a hamlet about a mile from the then western end of the town, across a cornfield and down the side of an old chalk pit to the beach, and had evidently been made for the purpose of serving a pair of limekilns, the foundations of which were then still standing. On the left of this track was a high grassy bank having an almost due south aspect, and this bank, as long as I can remember, was a haunt of *A. thetis*. Some thirty years ago the sloping front of the cliff between the town and this rough track was converted into parades, and the sloping banks between them planted with shrubs and flowers and kept in a state

of cultivation. More recently the rough track itself has been converted into a good road with asphalt path, and forms the chief connection between the lower parade and the road which runs at the top of the cliff. The chalk pit also has been planted with cypress and other trees, and converted into a miniature park as a finish to the parades. As a consequence this particular point has been brought well within the confines of the town, and there is a very considerable traffic on the road into which the old rough track has been converted. Yet, on any sunny morning during its season you may find *A. thetis* disporting itself on the few square yards of the original grassy bank that are still left, showing how pertinaciously a species will cling to its original haunts even under adverse conditions. So much for the butterflies.

Euproctis (Porthesia) chrysorrhæa.—One fine morning in the latter part of September, while on my way along the edge of the cliffs in the direction of Cow Gap, my attention was attracted by what appeared to be great numbers of pieces of sheep's wool attached to the twigs of the blackthorn bushes, but which on investigation proved to be the winter nests of *E. chrysorrhæa*. On some of them the young larvæ were sunning themselves. On October 3rd, another very fine mild day, some of the larvæ were again outside the nests, but on my next visit, a fortnight later, no larvæ were visible, the nests, however, had the appearance of having been thickened up and strengthened in the interval, no doubt having been prepared to withstand the winter storms. The species has occurred in the immediate neighbourhood, to my own knowledge, since 1902, generally being confined to one or another of the small clumps of bushes that grow thereabout, and on occasion, sufficiently commonly to completely devastate the particular clump attacked before the larvæ were full-fed, but I have never before seen the nests so abundant as they are this winter, and although the bushes attacked form by far the largest clump in the neighbourhood, it is doubtful whether even they will be sufficient to provide food for the growing larvæ in the spring. (See "Proc.," 1907, p. 12.)

ANTS.—On the afternoon of September 18th, while walking through Cow Gap, we could not help noticing the enormous numbers of winged ants that were on the move; hardly a foot of ground was free from the crawling hosts and the air appeared to be full of them. The species concerned, Mr. Donisthorpe, who was present informs me, were *Donisthorpea nigra*, *D. flava*, and *Myrmica scabrinodis*, and we had evidently hit upon them in the midst of their marriage flight. One knows that ants' nests are fairly numerous in this locality, but it is only on such occasions that one appreciates the vast numbers of the individuals, and wonders whether their presence has anything to do with the abundance of *A. coridon* and *A. thetis* in this locality.

BIRDS.—During the early autumn the Martins (chiefly *Chelidon urbica*, I believe) are wont to congregate in great numbers on the

coast preparatory to starting on their migration to sunnier climes. Often on a fine evening one may see dozens resting on the top of the wire fences along the sea front, telephone wires, etc., while hundreds disport themselves in the air, but by the following day nearly all are gone. Other swarms then gradually collect until they, too, disappear as suddenly. These successions of migrations usually occur from mid-September to mid-October, but one generally sees very few Martins hereabouts after that time. I was therefore not a little surprised, on November 7th, to notice the evident collection of a migratory swarm of these birds on the coast, it was not a large one it is true, and probably included rather less than a score of individuals, nor does the date constitute a record, as migrations have been noted as late as the 16th, but then records are exceptional, and not often repeated. Probably these belated migrants are late-hatched birds that are not strong enough to start their journey with the earlier groups, and possibly it was such as these that caused our older naturalists to believe that the Martins hybernated in this country.

ABSTRACT OF PROCEEDINGS.



FEBRUARY 11th, 1915.

Mr. A. E. GIBBS, F.L.S., F.E.S., *Vice-President*, in the chair.

Messrs. Gordon Fryer, of Twickenham, and E. J. Bunnett, of Forest Hill, were elected members of the Society.

Mr. L. W. Newman communicated the following record :—
“ Following my record of the copulation of *Pyrameis atalanta* on October 12th, 1914 (*vide* “Ent. Rec.,” 1914, p. 253), my notes are :—Ova were laid on October 13th-14th and hatched on November 1st to 28th. Larvæ were kept warm and fed up rapidly, the first to pupate being on November 27th and the last on December 3rd. Immediately the pupæ were firm enough to handle they were removed from the heat and at once placed in my winter pupæ-house on the concrete floor in metal boxes. Pupæ kept in this house get the frost, and are usually a week later in emerging in the spring than the natural time, as they never get any sun and the floor of the house is well below the ground level.

“ My hope of keeping my fertile ♀ till the spring was doomed to failure, as in early January I had to go into hospital for an operation, and on my return home at the end of the month I found the cage containing all my specimens of the species had been neglected, not having been fed regularly, and all except two males were dead. This has ruined a very interesting experiment, *viz.*, to see if it were possible to keep a *fertile* female alive all the winter, and I very much regret the accident. My pupæ (some forty in number) show no signs of forming up yet and are still lively ; so I think I may claim to have proved that *P. atalanta* can pass the winter in the pupa stage. This discovery seems of great importance and would tend to throw a new light on the life-history of the butterfly in England. As many know, I have

proved to my own satisfaction (but not to that of some others), that *P. atalanta* cannot pass the winter as an imago. I have for the past ten years experimented with the species, and the only way in which I can carry it successfully through the winter, is by feeding it regularly.

"I grant that several undoubted records are to hand of the imago being found alive in January and February, among them that of my friend Mr. Barnes, of Farnborough, whose record is without dispute; but his finding the species apparently hybernating does not prove that those specimens were going to live till April or May and pair and carry on their race. We all know that in mild autumns and winters you can find larvæ and pupæ in November and December, and we usually bring these into a warm room and breed out the imago in December or early January. Why should not these found specimens be very late natural emergencies, say, January ones, and that being the case, they would live for a few weeks without food tucked snugly away amongst creepers, but would die off before the spring. We have, many of us, caught in April or early May absolutely perfect specimens, which look as if just out of the pupæ, and my discovery that the species can remain as a pupa through the winter seems to clear up the mystery of these fresh specimens.

"I wish it clearly understood that I am still of the opinion that we are almost entirely dependent on immigration for our supply of *P. atalanta*."

Mr. R. Adkin remarked on the importance of Mr. Newman's observations in bringing such definite information on a point in the life-history of *P. atalanta*, which had hitherto eluded one's knowledge.

Mr. Frohawk said that *P. atalanta* was on the wing all the winter in suitable weather in the Scilly Isles. It apparently had a hibernating stage, but there was a succession of broods throughout the year. The temperature of these islands was uniformly warm, varying from 47° in winter to 57° in summer.

Mr. J. Platt-Barrett said that *P. atalanta* was to be seen all the winter in Sicily on favourable occasions.

Mr. F. W. Frohawk exhibited a large number of lantern slides of bird subjects, and gave an address on them, including much first hand information of his own observations in the Scilly Isles and elsewhere. He subsequently contributed the following notes containing a resumé of his remarks on

THE "BIRD-LIFE OF THE SCILLY ISLES. THE MANX SHEARWATER."

"To the ornithologist and botanist it would be difficult to find a holiday resort more full of interest than the Islands of Scilly, they teem with bird-life, flowers, ferns and sub-tropical vegetation.

"This delightful group of islands are situated about 27 miles south-west of the Land's End and 40 miles from Penzance, from which port the passage occupies from three to five hours, according to weather conditions. The group consists of about 200 islands and islets, some of the latter composed of bare granite rocks. Only five of the larger islands are inhabited, *viz.*, St. Mary's, Tresco, Bryher, St. Martin's, and St. Agnes. There is little doubt that in pre-historic ages the most westward of these islands formed the Land's End of Britain.

"All the islands and rocky islets are frequented by innumerable sea birds, which nest there unmolested, due to the protection afforded them by the Lord Proprietor, Mr. T. A. Dorien-Smith. From an ornithological point of view Annet, or Bird Island, is perhaps the most interesting. It is a small island, being about half a mile in length and much less in breadth, and lies south-west of the group. It is the home of an extraordinary multitude of birds, of which puffins are the most abundant, next in number are the Manx Shearwaters, and then the three species of gulls, of these the lesser black-back is most numerous, then the herring gulls, while several pairs of great black-back gulls are dispersed over the tallest rocks along the shore. Other nesting birds are shags, cormorants, oystercatchers, ringed plovers, terns, razorbills, storm petrels, rock pipits, and lastly and least in size the common wren.

"When I first visited this island during the height of the nesting season in 1904, I was astonished at the amazing number of puffins breeding there, I then estimated at least 100,000 were nesting on Annet. If only 40,000 pairs out of the total number brought off their young (a single young one), during the following August, no less than 140,000 puffins, young and old, left this one small island to spend the next six months at sea, scattered somewhere over the ocean, but to what part of the world these birds retire has yet to be ascertained. As I have already stated, the shearwaters ranked next in number, amounting to at least 30,000, as a safe estimate. Of this most interesting and curious bird a few notes may be given, as it is a species which is not commonly observed owing to its crepuscular and nocturnal habits. Formerly it bred abundantly on the Isle of Man, but for some years past has been considered extinct

there as a breeding species. It nests on several of the westward islands of Scotland, the Orkneys and Shetlands, also on some of the Irish islands, and on Skomer off the Pembrokeshire coast. In the Scillies I spent a considerable time in studying the habits of this bird, and purposely passed a night on Annet in order to observe their movements during the few hours of darkness in early June. I landed on this wild island on the evening of June 3rd, 1904, and spent such a memorable night among the host of sea birds that it was an experience and pleasure never to be forgotten and rivals description. The spot selected to pass the night was one of the highest parts of the island, and which turned out to be the most suitable site, as every part of the ground was honeycombed with their nesting burrows. Up till 9.45 p.m. the time was mostly occupied by watching the movements of the puffins, which continued leaving and returning to their nests as long as the twilight lasted. At 9.45 I took up my position for the night. After waiting a few minutes the shearwaters commenced crowing to each other underground, which produced a very weird effect in the darkness. Suddenly, at ten o'clock, they all appeared to leave the burrows at the same time, they emerged so quickly that for a minute or two they fluttered around in a great swarm, in the dim light I could just see their dark forms flapping about over the surface of the ground trying to rise, which they are unable to do without the aid of some hillock or other eminence from which to take flight. Very soon afterwards the air was filled with a dense swarm of these queer birds, flying round and round, crowing loudly, the noise they made by their remarkable cries was so great that the roar of the sea beating against the rocks only 30 or 40 yards away was drowned by the uproar they made. This wonderful assemblage of shearwaters kept up the flight and screaming for just three hours, when, at 1 a.m. precisely, there suddenly became silence, as if caused by some word of command, and the whole multitude went to sea, where they again set up their perpetual cries and continued until just before dawn, when they were heard no more. Apparently they all went to some distant fishing ground to return again at sundown, as at that time they are generally to be seen flying over the surface of the water round the islands, or careering along in a direct line homewards.

"Although a few pairs nest on some of the other islands, Annet is the home of this bird, where their nesting burrows honeycomb the whole of the ground except part of the centre, which is a bed of bracken occupied by a colony of lesser black-back gulls.

"Like the shearwaters the puffins riddle the ground with nesting

burrows, and very frequently nests of both species occupy the same burrow, when such is the case the puffin's egg—both birds lay one egg only—is always nearest the entrance. The shearwaters nest is placed at various distances down the burrow, sometimes about 3 ft., but usually further, often at many feet from the mouth of the hole. In one instance, on another island, I found the parent bird sitting on its egg at the remarkable distance of 24 ft. from the entrance, as this was not the end of the burrow I carefully opened it up, and after digging for another 12 ft. I came upon a fully grown rabbit crouched at the end of the burrow. How these two creatures contrived to occupy the same burrow, which was only just large enough in diameter for one to pass along at a time, and as it had but one entrance, which had to act as exit also, it is somewhat of a puzzle, unless they gave each other the signal for one to emerge or enter to let the other pass along."

"The accompanying drawing (Plate vii.), represents one of the birds, of which many were found on their nests, taken from the nesting burrow between 3 and 4 a.m. At first it was placed on a rock, from which it climbed on to the author's hand, and finally settled down on his arm as shown, where it peacefully rested until removed."

FEBRUARY 25th, 1915.

This was an evening for the exhibition of Lantern Slides.

Mr. W. West (Ashtead) exhibited slides of a freshwater alga, larva of a lace-wing fly, the *Psylla* of the apple tree, larva of a firefly, a *Coccus* of the banana, ditto denuded of its waxy covering, an *Aphis* from dogwood, ditto parasitised, pupa of the parasite, imago of ditto, pupa of a midge on bark, the midge emerging, a ♂ of ditto, and the antennæ of ♂ of ditto.

Mr. Tonge exhibited slides of a species of *Tenthredo*, resting attitude of *Cidaria pyraliata*, ditto of *Bryophila muralis* (*glandifera*), ditto of *Notodonta ziczac*, ova of *Dasychira pudibunda*, borings of *Sesia andrenæformis* in viburnum stem, resting attitude of *Sesia ichneumoniformis*, ditto of *Manduca atropos*, pupa of *Apatura iris*, pupa of *Limenitis sibylla*, larva of *Gonepteryx rhamni* hung for pupation, larva of *Pieris brassicæ* hung for pupation, pupæ of ditto, pupa of *Papilio machaon*, pupa of *Euchloë cardamines*, larva of ditto hung for pupation, pupa of *Pararge ægeria*, resting attitude of *Hamearis lucina*, larva of ditto, pupa of *Dryas paphia*, and pupa of *Melitæa aurinia*.

PLATE VII.



FEARLESSNESS OF THE MANX SHEARWATER.

A wild bird on the Author's arm, 4 a.m., 4th June, 1904.

Mr. Bunnett exhibited slides of scales of *Bithys quercus*, battle-dore scales of ♂ *Pieris rapæ*, scales of *Mania maura*, scales of *Tinea pellionella*, tongue of *Adopæa flava*, cornea of *Pyrameis atalanta*, cremastral hooks on pupa of ditto and of *Pieris brassicæ*, prolegs of larva *Aglais urtica*, stick insect at emergence from ovum, ova of a *Corixa*, larva of *Simulium*, empty cases of the pupa of ditto, larva of an aphid, etc.

Mr. Colthrup exhibited slides of the primrose, blackthorn, larvæ of *Coccinella bipunctata*, pupa of ditto, *Helix cantiana*, the sea holly, resting attitude of *Himera pennaria* ♂, ditto of *Mimas tilia* ♂, ditto of *Amorpha populi*, ditto of *Mania maura*, ditto of *Phlogophora meticulosa*, aberrations of *Agriades coridon*, aberrations of *Dianthæcia carpophaga*, aberrations of *Luperina testacea*, larva of *Amphidasis betularia* on rose, larva of *Endromis versicolor*, ditto of *Stauropus fagi*, ditto of *Lycia hirtaria* light and dark forms, ditto of *Pachygastria trifolii*, ditto of *Cuspidia megacephala*, and a ditto of *Asteroscopus nubeculosa*.

Mr. Colthrup also exhibited sets of slides on behalf of the members of the Nature Photographic Society, viz.:—

For Mr. Bedford, the fen orchis, the large helleborine, the lizard orchis, the man orchis, the bee orchis, and the large butterfly orchis.

For Mr. Salmon, a series of the blackheaded gull, in flight, nesting mode of female, settling on nest, courtship, and young.

For Mr. Sanders, a series of the cuckoo, young in a hedge-sparrow's nest, two stages of growth, being fed, a wren feeding a young cuckoo, and a brood of young kestrels.

For Mr. Main, ova of a lace-wing fly, ova of another species, larva of ditto, cocoon of ditto, cocoon opened to show circular lid, pupa of ditto, lid of cocoon, imago of ditto, and various views of the same.

For Mr. Hocking, a series of British fungi.

For Mr. Tonge, *Aporia crategi* on pupa-case, ova of *Pyrameis cardui in situ*, larva of *Brenthis selene*, ditto of *Dryas paphia*, ova of *Ruralis betulæ*, and ova of *Amphidasis betularia*.

For Mr. Irving, an oak tree in summer and in winter, the bole of ditto, the polar bear, the leopard, and the jaguar.

For Mr. Stanley Cooke, the long-tailed tit, the tawny owl, young of ditto, male rook getting twigs for a nest, loaded with twigs for flight, going for food.

Mr. Newman exhibited a fine series of *Celerio gallii* bred from

N. Cornwall ova. They were forced in January, and specimens were still emerging.

Mr. J. Platt Barrett exhibited a series of *Euchloë damone* from Sicily, and stated that the variation in the species was extremely slight.

Mr. F. W. Frohawk exhibited a series of *Arctia caja* bred and captured in the Scilly Islands. They were of the yellow form of various shades. He said that in some years the species was very abundant, and in 1897 in countless thousands. One specimen exhibited had but little cream colour on the forewings, and the hindwings had the submarginal spots coalesced into a wide band.

Mr. Adkin stated that the late Mr. J. Cooper years ago took a number of larvæ of this species on Wanstead Flats, and on one day subsequently bred no less than six or seven yellow forms, while no other specimen showed that aberration.

Mr. B. H. Smith exhibited a species of beetle found doing great damage to a cargo of Tasmanian peas which had recently been imported. It was subsequently found to be *Bruchus chinensis* (*pectinicornis*).

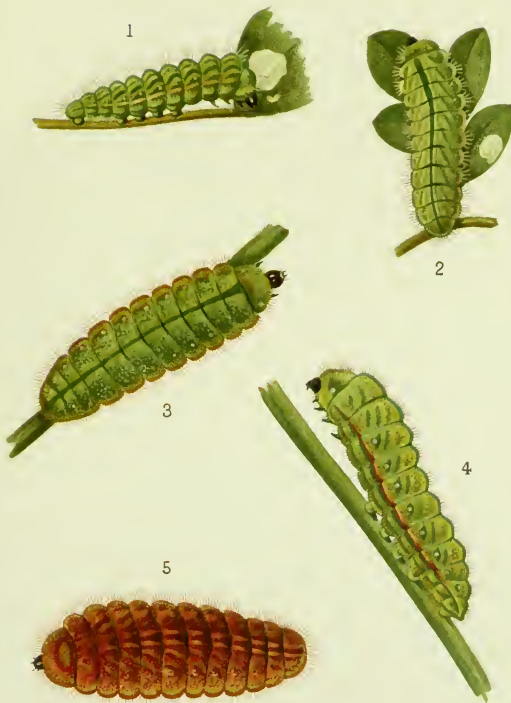
MARCH 11th, 1915.

Mr. A. E. GIBBS, F.L.S., F.E.S., *Vice-President*, in the chair.

Mr. R. T. Bowman exhibited a bred series of *Ephyra pendularia* and read the following note:—

"I have a few examples of *Ephyra* (*Zonosoma*) *pendularia* to show, which I believe to be the form known as var. *subroseata*. In the autumn of 1913 I beat a number of wild larvæ in Surrey, and when the imagines emerged in May of last year, to my astonishment I found one was what I presumed to be var. *subrosaeta*. This example, which was a female, was paired with a typical male, and I obtained 32 ova and eventually 32 pupæ. Of the 32 pupæ, 28 imagines emerged between the 28th of June and the 6th of July, and one in the first week of September, so that 3 are still in the pupal stage. Of the 29 imagines 16 turned out to be of the typical form and 13 of the pink form, and these again are divided, the 16 typical into 7 ♂ s and 9 ♀ s, and the pink into 6 ♂ s and 7 ♀ s, a slight preponderance of the ♀ sex."

Mr. A. E. Gibbs exhibited a specimen of the huge South American Noctuid, *Thysania agrippini* (*Noctua strix*) from Costa Rica, from whence several examples had recently been sent to him.



E.C.Knight del.

West, Newman chr

LARVAE OF EVERES ARGIADES.

It was stated to be a somewhat widely spread species. Mr. W. J. Kaye stated that he had seen it in the island of Trinidad, where it was considerably smaller in size. It rests on tree-trunks with out-spread wings like an *Eupithecia*.

Mr. Witcher, who was present as a visitor, exhibited a remarkable gynandromorphous hybrid *Smerinthus ocellatus* ♂ × *Amorpha populi* ♀, in which the L. side was ♂ and the R. side ♀.

Mr. Hy J. Turner exhibited a copy of an uncommon book, "Illustrations of British Mycology," by Mrs. Hussey, vol. i., 4to., 90 coloured plates, which he had recently acquired from a bookseller, who was about to tear the plates out and sell them as "pretty pictures" for a few pence each.

The rest of the evening was devoted to microscopical exhibits.

Mr. R. Adkin exhibited under the microscope portions of the cocoon of *Dicranura vinula*, arranged to show the ribbon-like form of the material of which the cocoon is constructed. He also exhibited antennæ of several species of Lepidoptera.

Mr. W. West (of Ashtead), exhibited slides showing androconia of *Pieris brassica*, specimens of a *Coccus* found on bananas, and a beautiful micro-fungus on wood, *Hypoxylon coccineum*.

Mr. Coxhead exhibited a number of mites discovered infesting Brazil-nuts.

Mr. Ashdown exhibited a number of minute species of Coleoptera and Hemiptera, including:—*Luciola italica*, *Phosphæus hemipterus*, *Anthaxia nitidula*, *Pacilonota rutilans*, *Metacanthus punctipes*, *Asiraca clavicornis*, and a larva of *Ledra aurita*.

Mr. Bunnett exhibited the larva of a thrips, which had been attacked by a micro-fungus.

Dr. Chapman showed mounted skins of the larvæ of *Everes argiades* in the first and last stages. In the first stage the larva is of the form and has the hairs, lenticles, etc., on the general type found in the "blue" butterflies. It differs in some details from that of its nearest British ally, *Cupido minimus*.

By the courtesy of the Editors of the "Ent. Mo. Mag.," certain plates illustrating this larva are reproduced in the "Proceedings."

The following is an abstract from the notes in "Ent. Mo. Mag.," 3rd series, Vol. i. (li.), p. 35.

"Plate II. shows the larva magnified nearly five times. Figs. 1 and 2 show the larva in its penultimate instar, and figs. 3 and 4, when full grown. In the summer broods, the larva maintains this appearance (with little change) up to pupation, but the autumn larvæ, which hibernate, assume, in order to do so, the coloration

shown in fig. 5. This change of colour for hibernation was described by Zeller in 1849, "Stett. ent. Zeit." vol. x., p. 177-182.

I may quote the following from my notes :—

September 9th, 1913.—The first stage larva, when a little grown, about 1.5mm. long, is, when sufficiently magnified, rather handsome. It has a dark green dorsal line, paler green elsewhere with a series of horseshoe-shaped red marks round the spiracles. Seen dorsally there are oblique green lines, downwards and backwards from the dorsal line, ending in a pink-red line about middle of slope. It is remarkable that on further magnification these oblique lines are not visible. They are, however, plain enough in the second instar.

In its fourth instar (penultimate) the larva has a very definite dark green dorsal line, bordered by paler, that is, almost yellow. The lateral line on flange has a very bright reddish-pink colour; between these the almost yellow oblique lines are very marked, four on each segment, the lowest close to flange, rather obscure. Each oblique streak therefore appears to be complete, downwards and backwards, across four segments. The red lateral line is red from the 2nd to the 7th abdominal segments. On the other segments it is at first rather yellow; as the larva grows the red becomes rather rusty, the yellow becomes whitish.

In the last (5th) instar the red lateral line is dull rusty in colour and the oblique lines are pale, but not yellow; the spiracles are orange and rather conspicuous. Of the hair bases, some are black, some are yellow, the latter more dominant dorsally, and about the middle of each segment. They are rather brilliant and sparkling in direct sunlight. The larger, pale rufous hairs are still rather abundant dorsally and laterally.

When almost ready for pupation, although still eating, the larva assumes a much darker tone, the ground colour being a rich, but pale, pinkish-brown, on which the pale, hardly yellow oblique lines are very distinct.

When apparently definitely fixed as if for pupation the larva is very dark, having passed through a red-brown stage in which the oblique lines were especially conspicuous. The larva observed made a nest at the bottom of the tin under a leaf with enough spinning to be almost entitled to be called a cocoon. This proved, however, to be for a hibernaculum.

Plate VIII. will give some idea of the distribution of hairs and lenticles in the first instar which conform to the general *Lycenine* type.

PLATE VIII.

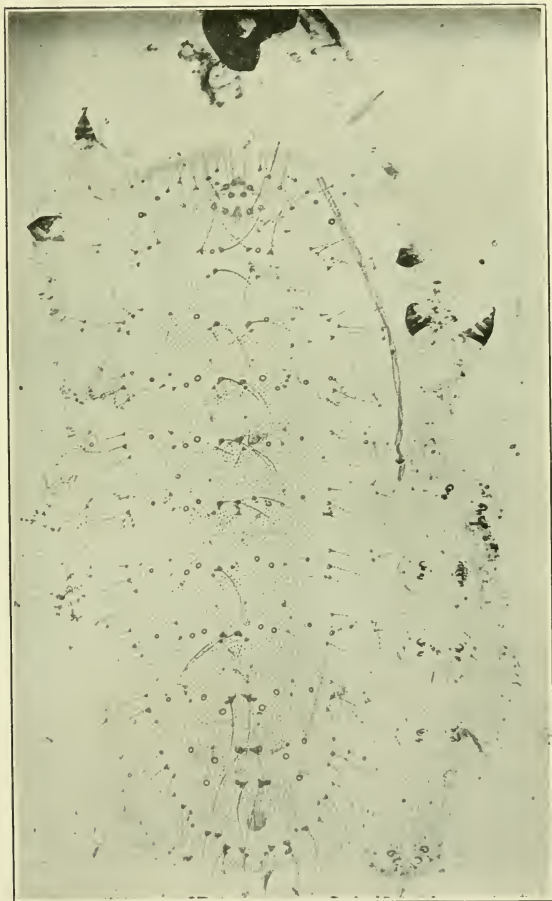


Photo. by F. N. Clark.

SKIN OF LARVA OF *E. ARGIADES* IN FIRST INSTAR $\times 60$.

PLATE IX.

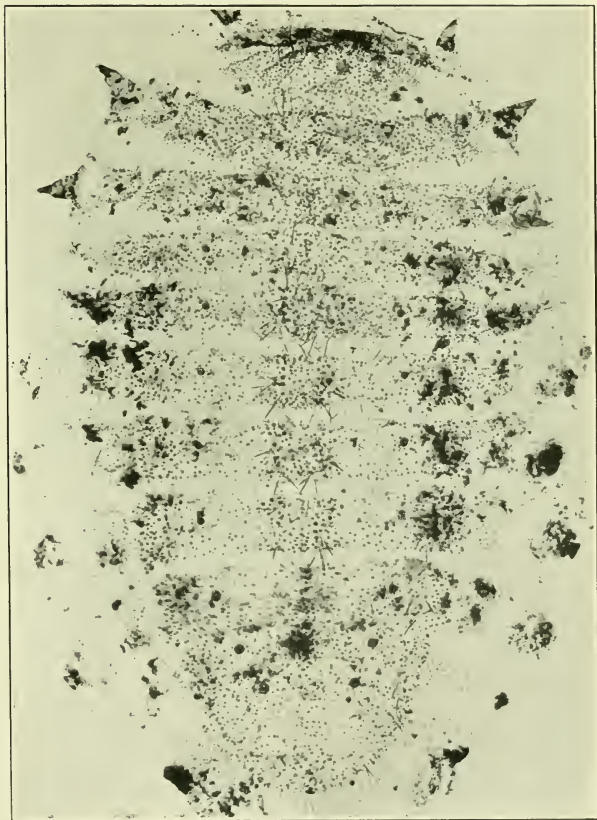


Photo. F. N. Clark.

SKIN OF LARVA OF *E. ARGIADES* IN LAST INSTAR, $\times 16$.

PLATE X.

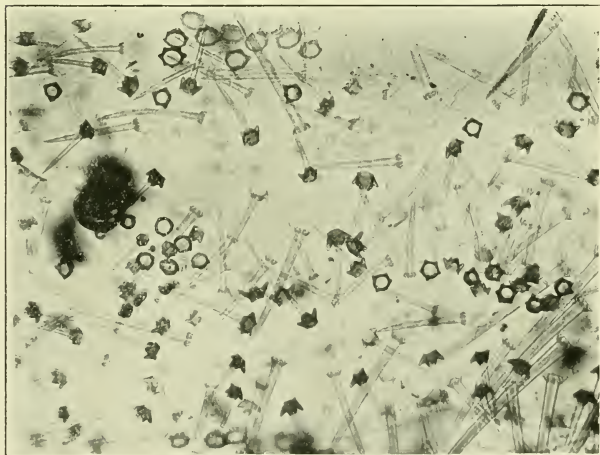
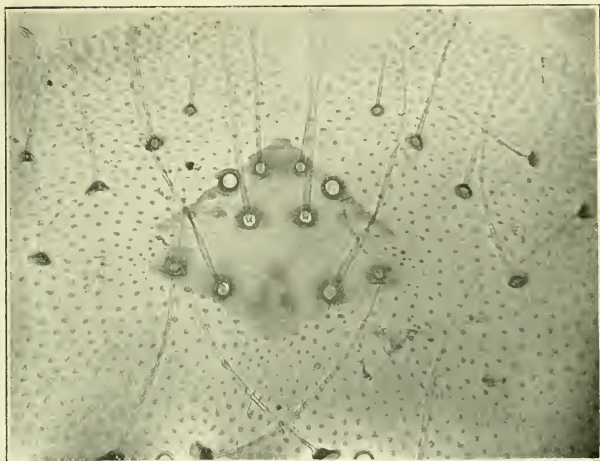


Photo. by F. N. Clark.

LARVA OF *E. ARGIADES*, PROTHORACIC PLATE, FIRST INSTAR, $\times 250$;

SPIRACULAR REGION, LAST INSTAR, $\times 100$.

PLATE XI.

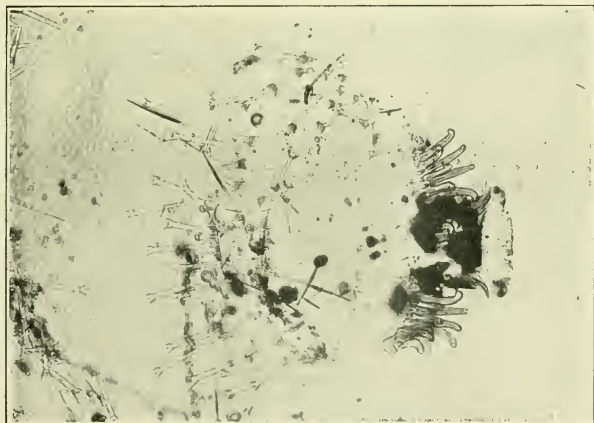
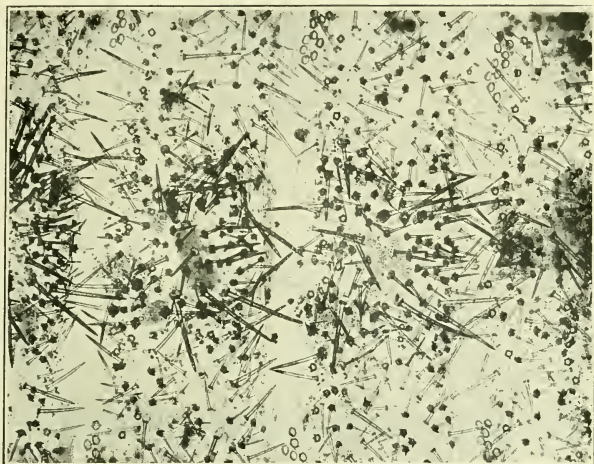


Photo. F. N. Clark.

LARVA OF *E. ARGIADES*, LAST INSTAR, DORSAL REGION, $\times 40$; PRO-LEGS, $\times 100$.

Plate IX. shows the same in the last instar.

The photographs of the larval details may be regarded as supplementing those I contributed to Tutt's "British Lepidoptera," vol. x., plates VIII., IX., X., and may be compared with those of *Cupido minimus*, our only British species of the Everid tribe.

Mr. Tutt in "British Lepidoptera," vol. x., pp. 43-101 summed up what has hitherto been ascertained as to *Everes argiades*, and this may be consulted for further details."

MARCH 25th, 1915.

The main subject of the evening was the special exhibition of series of *Aphantopus hyperantus*, contributed to by Messrs. Frohawk, R. Adkin, Bright, Edwards, Turner, Dennis, Curwen, Ashdown, B. W. Adkin, Gibbs, and Leeds, and the discussion thereon.

Mr. R. Adkin's exhibit of *Aphantopus hyperantus* comprised series from many English localities, including a long row from the neighbourhood of Carlisle, the greyish tone of colour of the undersides of which was very noticeable as compared with the browner shade of the more Southern examples. Several specimens showed considerable variation in the markings of the underside, the extreme in the one direction having the ocelli large and in some cases elongated, while in the other they were reduced to mere dots = var. *arete*, or absent = var. *caca*. Two specimens showed considerable bleaching similar to that which is not infrequently found in *Epinephele jurtina*.

Mr. W. J. Ashdown exhibited specimens of *Aphantopus hyperantus* from Switzerland, France, and the New Forest, showing the variation in ground colour and in number of spots on the undersides.

Mr. Leeds exhibited specimens of *A. hyperantus* and particularly pointed out examples with asymmetrical markings.

Mr. Frohawk exhibited his series of *A. hyperantus*, including fine examples of the ab. *lanceolata*, and called attention to the very considerable variation occurring in the number and development of the eye-spots, and in particular pointed out in various exhibits odd specimens in which a very small additional apical ocellus was apparent on the forewings.

Mr. A. E. Gibbs exhibited from British localities, ab. *caca* from Howick; ab. *arete* from Cambridge; ab. *vidua* from Cambridge, Cornwall, and New Forest; and from Continental localities, ab.

arete from Poligny, French Jura, and Weimar; asymmetrical forms from the French Jura, with 3 ocelli on R. forewings and 2 on L. forewings; specimens from Eclépens showing well-developed transverse lines on hindwings.

Mr. Hy. J. Turner gave a summary of the history of the species of which the following account was the basis:—

The species we are discussing to-night was first described in 1758 by Linneus in the "Systema Naturæ" (Ed. x., p. 471) as follows: *Papilio* (Danai, Festivi) *hyperantus*, "alis integerrimis fuscis; primoribus subtus ocellis tribus; posticis utrinque quinque."

Habitat in Europæ sylvis."

In 1761 the same author, in "Fauna Suecica" (p. 273), redescribed *hyperantus* as follows:—Alae concolores, fuscae, margine albido. Primores supra punctis 2 nigris, vix ocellatis; subtus ocellis 3, postico minore. Secundariæ supra punctis 2; subtus ocellis 2 approximatis anterioribus and 3 posterioribus distinctis.

In 1763 Scopoli in the "Entomologia Carniolica" (p. 157), either ignoring or in ignorance of the Linnean name, re-described the species as *Papilio polymeda*.

In 1764, O. F. Müller in "Fauna insectorum Fridrichsdalina" (p. 86) after giving *hyperantus* (p. 33) described *P. arete* as follows: "alis dentatis utrinque cinereo-fuscis; primoribus duobus, posticis quinque punctis albis," which we now identify as an aberration of *hyperantus*.

The same author (l.c., p. 86) described *P. vidua* as follows: "alis dentatis supra nigro-cinereis immaculatis; subtus e flavo cinereis nitidis, ocellis primoribus 2 posticis quinque." This is evidently another form of *hyperantus* ["possibly a ♀ form," Tutt, *in lit.*]

In 1767 Linneus, in "Systema Naturæ" (Ed. xii., p. 768), substituted "posticis duobus tribusque" for "posticis utrinque quinque" in the xth Ed.

In 1767 Moses Harris, in his "Essay" on the nervures as characters for establishing genera, placed *hyperantus* in the genus *Argus*, with other British Satyrids.

In 1775, Fabricius in "Systema Entomologiæ" (p. 486) remarked on the variation "alis supra ocellatis et immaculatis," and spelt the name with an *h*, *P. hyperanthus*.

In 1777, Scopoli, in his "Introductio ad Historiam Naturalem," employed the name *Argus* for a heterogeneous assemblage of more than 50 species including *hyperantus* and even *Urbicolids*.

In 1779, Goeze, in "Entomologische Beiträge" (vol. iii., pt. 1., p. 288), described *Papilio octoculatus*, a description which is now

considered as a form of *hyperantus*, previously dealt with by him (l.c., p. 195). ("If it be included here at all it must be as a var." J. W. Tutt *in lit.*).

In 1781, Barbut, in his famous work "Genera Insectorum of Linnæus," used *hyperantus* as the British exponent of the *Festivi* section of the *Danai* group of the Linnæan *Papilio*.

In 1783, Retzius, in his "Genera et Species Insectorum" of de Geer, re-named the species as *Papilio tristan* (p. 33) giving as a synonym Linneus' name *hyperantus*.

In 1799 (?), Hübner, in "Sammlung Europaischer Schmetterlinge," figured *Papilio polymeda* (172, 173), and in 1806 gave the text referring to the figures (p. 28) indicating fig. 173 as the form *arete* which he wrongly ascribed to Schneider, "Systematische Beschreibung," p. 102 (1787).

In 1801, Schrank, in his "Fauna Boica" (vol. ii., pt. 1), placed *hyperant(h)us* in his second group in a comprehensive genus, diagnosed in some detail, *Maniola*.

Our own Haworth, in 1803, in "Lepidoptera Britannica" (vol. i., p. 14), gives the typical form and refers to a form "*alis utraque inocellatis vel punctis obscuris loco ocellorum*," i.e., the form *arete* of Müller. This is our first reference of its being found in Britain.

In 1805, Latreille, in his "Histoire Naturelle, générale et particulière des Crustacés et des Insectés" of Buffon's works, placed *hyperant(h)us* in his *Satyri* section of the very "omnibus" genus *Nymphalis*.

In 1807, in "Illiger's Magazin," (vol. vi., p. 277, etc.), appeared a long article on the Classification of the Butterflies and Sphingids, giving the new genera proposed by Fabricius in his "Systema Glossatorum" (unpublished), and by Latreille in his "Histoire Naturelle." In this article *hyperant(h)us* is placed in the genus *Hipparchia*.

In 1810, Latreille, in his "Considérations Générales" (pp. 355 and 440), proposed the genus *Satyrus*, but did not indicate all the species it embraced until 1819 in his article in the "Encyclopédie Méthodique." Here he put *hyperant(h)us* in his section H of the comprehensive genus *Satyrus*.

Previous to this inclusion in *Satyrus* Hübner had issued his famous "Verzeichniss bekannter Schmetterlinge," in 1816, and there described the genus *Enodia* (p. 61), placing in it the three species *andromache*, *dejanira*, and *hyperanthe* (*polymeda*, Scop.) (*hyprant(h)us*, L.).

In the same year, 1816, Dalman published a "Systematic

Revision of the List of Swedish Butterflies," and diagnosed a genus which he called *Erebia*, with the type *ligea*, and including *hyperantus*.

In 1828 Stephens, in his "Illustrations of British Entomology" (Vol. i., p. 60), dealt with the variation of *hyperant(h)us* in considerable detail. He briefly described no less than 17 aberrations in addition to the type form, but wisely refrained from adding to our nomenclature thereby. These forms are mainly mutations of the number and development of the spots. His genus is *Hipparchia*. But in volume iv. (1835), he gave *hyperant(h)us* as the British representative of the Hübnerian genus *Enodia*.

In 1839, Freyer, in his "Neuere Beiträge" (iv., plt. 290), figured and described two forms, but does not name them. ("Neither of these is very characteristic."—Tutt *in lit.*)

In 1843, Herrich Schæffer, in his "Schmetterlinge Europas" (Vol. i., p. 81), placed *hyperant(h)us* in the genus *Epinephale*.

In 1853 Wallengren, in his "Lepidoptera Scandinaviæ Rhopalocera" (p. 30), diagnosed a genus, *Aphantopus* for *hyperant(h)us* alone.

In 1868 Butler, in his "Catalogue of Diurnal Lepidoptera," placed *hyperant(h)us* in the sub-genus *Minois*, Hüb., of the genus *Satyrus*.

In 1882 Butler, in the "Annals and Magazine of Natural History" (vol. 5 (ix.), p. 14), described the large Eastern Asian form as *ocellatus*, "major subtus obscurior, ocellis majoribus, Stgr."

In 1884 Fuchs, in "Macrolepidopteren des unteren Rheingau" ("Stett. e. Zeit.," p. 252, etc.), described the form ab. *cæca* as follows, "The white points of the ab. *arete* of Müller are entirely wanting on the undersides of the forewings, which are consequently wholly dark. On the hindwings only solitary points are faintly indicated. The more distinct point stands as the second from the anal angle of the wings. On each side of this there is merely a white atom indicated, the rest are wanting. Ab. *cæca* is a further development of ab. *arete*."

In 1891 Fuchs, in a further article in the "Jahrbucher des Nassauischen Vereins für Naturkunde" (p. 215), described a dwarf form as ab. *minor*, from specimens taken in the Bavarian Alps at a height of 872 metres (about 3,000 ft.). He says, "The expanse of forewings from base to apex is only 17mm. in the ♂s and 20mm. in the ♀s, compared with 21mm. ♂s and 24mm. ♀s in the (average) Nassau examples. The wing shape is also somewhat different; both sexes have narrower wings, and thus in the female the wings

are distinctly more pointed." He goes into considerable more minute detail. [Tutt remarked on this author, "Fuchs, is on the whole, one too many for me," *in lit.*]

In 1892 Staudinger, in the "Mémoires Romanoff" (vol. vi., p. 206), described the *hyperantus*-form from the Amur district of Asia as *amurensis*, a much larger form, in which the wings are considerably widened. In "Cat.," ed. iii., 1901, he afterwards acknowledged that this was identical with the *ocellatus* of Butler.

In 1895 J. W. Shipp, in the "Entomologist" (vol. xxviii., p. 17), described the form figured in 1893 by R. South (vol. xxvi., p. 281), and named it *lanceolata*. The chief points in it are—"Upper surface, hindwings with four similar ocellated lanceolate spots," "in one or two instances produced to a point." "Underside, forewings with two large semi-lanceolate ocellated spots," "hindwings with five lanceolate ocellated spots," etc.

In 1896, Tutt, in his "British Butterflies; Hedgerow Series" (p. 412), introduced a form *obsoleta*, "with no trace of ocellated spots."

In 1908, Seitz, in "Macrolepidoptera of the World. Palæarctic Fauna" (vol. i., p. 137), described and figured the following two forms of *hyperantus*; (1) *arctica*, a small form from the highest north, and (2) *centrifera*, the form with the white eye-centres, *i.e.*, small rings filled in with white dots often visible on the upperside as well.

[I have endeavoured to find out the origin of the aberrant spelling, which one occasionally meets, of *hyperantus* as *hyperanthes*, but without success so far.—H.J.T.]

In 1903 the Rev. G. Wheeler, in his "Butterflies of Switzerland" (pp. 115-116), gave the direction of the variation obtainable in *hyperanthus* as follows:—

- (a) Great diminution of size, *e.g.*, ab. *minor*, ab. *arctica*.
- (b) Loss of eye-spots, *e.g.*, ab. *arete*, ab. *cæca*, ab. *obsoleta*.
- (c) Number of eye-spots. See Stephens' "Ill. Brit. Ent.," I., 60.
- (d) Arrangement of eye-spots, *e.g.*, ab. *vidua*, ab. *octoculata*.
- (e) Shape of eye-spots, *e.g.*, ab. *lanceolata*.
- (f) Presence or absence of eye-spots upper side.
- (g) Traces of transverse lines on underside, v. rarely.

During the subsequent debate other lines of aberration were instanced as follows:—

- (h) Occurrence of a band on the under side of the hindwing.
- (i) Presence of white points in the upper side eye-spots.

(j) Development of an additional minute apical eye on upper side of forewing in rare instances.

(k) Frequent asymmetry in number and in development of the eye-spots on the two sides.

(l) The partial non-development of pigment, i.e., existence of irregular pale areas in some examples.

(m) Variation in depth of ground colour, especially noticed on the under sides of races from different areas. (Carlisle, etc.)

(n) Gynandromorphs. No example of this aberration has hitherto been reported.

(o) Dr. Chapman noted that by daylight the points of the eye-spots on the forewings appeared yellow, while those on the hindwings were pure white.

Some divergence of opinion occurred as to the habit of *hyperantus* to occur in colonies of somewhat restricted areas. Undoubtedly small restricted colonies do occur, and the apparent divergence may be explained, possibly by assuming that numerous colonies with more or less closely approximating areas suggest a general distribution in some districts.

Mr. Bright exhibited three very interesting aberrations of British Lepidoptera.

(1) *Argynnis aglaia*, in which the black markings were much increased in area and coalesced into large blotches, some of which were radiate.

(2) *Polyommatus icarus*, an underside form of unusually light ground colour, giving an appearance like no other species of British "blue."

(3) An example of male *Agriades coridon*, in which the eye-spots on the lower wing were margined with traces of the red scaling which is usual in the female, a form known on the Continent as *ab. suavis*.

Mr. Edwards exhibited a grass snake which had been found at Blackheath a few days before.

Mr. Colthrup exhibited a large number of clutches of the eggs of the house-sparrow, and pointed out in each case that there was always one egg which differed considerably in marking from the greater uniformity of the rest. The "odd" egg was usually lighter than the rest. He contributed the following short paper:—

THE ODD EGG IN A CLUTCH.—"In 1911 I had under observation a number of nests of the House-Sparrow (*Passer domesticus*) built in the ventilators of a large building in the country.

"I found that in every nest where there was an odd egg, it was

the last laid. I had not the opportunity to watch which egg hatched first, so took a long series of eggs for reference, which I am showing together with a long series, taken at the same place in 1903 for the same purpose. That the odd egg is due to failure of colouring matter I have very great doubts, because the odd egg is almost always marked quite differently, in some cases being blotched while the other eggs are finely speckled, and *vice versa*. Although the pale eggs show more of the white ground-colour, the blotches are not weak in pigment, and are what I should call, using a photographic term, sharp—not washed-out or blurred. Looking at the various clutches I find that what is the odd egg in one clutch is the predominant one in another, and in some clutches the last and odd egg is the darkest.

“I have seen it stated that the influence of the male of a pair of birds cannot affect the colour of the egg laid by the female. What I suggest, however, is that the colouring of the odd egg may be affected through the male parent of the female having been hatched from a clutch where pale eggs were dominant.

“The regularity with which the odd egg occurs points rather to some law at work, either Mendelian or another law somewhat analogous to it, than to a mere absence of pigment. I should mention that in some clutches of five there is no odd egg at all. This may be caused through both the grandparents being from a stock which laid pale eggs or *vice versa*, as I have both pale and dark clutches without an odd egg.

“On the other hand, I have clutches of six where there are two odd eggs. That the odd egg is laid by the same female and not deposited by another, as I have seen suggested, is I think proved in one clutch, in which all the eggs are of the same peculiar shape, and in another in which all the eggs have a fault in the shell—a small bump—in the same position in each egg.

“I have a clutch of six eggs of the Linnet *Acanthis (Carduelis) cannabina*: five have the ground-colour white, and the sixth and last egg laid has a bright blue-green ground-colour. All the eggs have the markings normal.

“I have two clutches (five and six) of eggs of the Sparrow-Hawk (*Accipiter nisus*) with white ground-colour and deep brown markings, with the exception of the last egg laid, which in each case has a pale blue ground-colour and bright red markings. In one clutch four eggs have violet underlying markings; in the fifth and last egg these are absent.

“The odd egg, however, is not the last laid with all species. Last

year I found a nest of a Snipe (*Gallinago gallinago*) with two eggs only, one dark, the other pale. Subsequently two more pale eggs were laid. Of course I cannot be certain, but I should be inclined to say that the dark egg was the first laid, judging by my experience with other nests of this species and the Redshank, where the dark egg has been the first laid. I also found a nest of the Meadow-Pipit (*Anthus pratensis*) with one egg dark brown, and three pale grey. The following day a further pale grey egg was laid, which completed the clutch.

"In looking through my series I find in clutches of Robin, White-throat, Great Tit, Golden-crested Wren and Magpie, where there is an odd egg it is pale, but in those of the Blackbird, Carrion-Crow, Curlew, Tree-Pipit, Meadow-Pipit, Lesser Tern, Common Tern, Skylark, Kestrel, Redshank, Snipe, and Corn-Bunting, both pale and dark eggs occur, whereas in the Lapwing and Kentish Plover the ground-colour is sometimes paler or darker in one egg, the surface-markings being pretty equal in all eggs in the clutch. Ringed Plover clutches do not as a rule contain an odd egg, but I have one in which three eggs are blotched and the fourth finely spotted, and another clutch is exactly the reverse."

MARCH 27th, 1915.

FIELD MEETING AT ONSHOTT AND CLAYGATE.

Leader, W. J. KAYE, F.E.S.

To hold a Field Meeting at so early a date was quite an innovation. It was thought by the Council that given suitable weather there would be the possibility of procuring several of the early species of Lepidoptera in some number. Fate, however, was not favourable, for the wind was biting, and although the ramble was a very pleasant one, leading as it did through grounds that are usually closed to the naturalist, nothing was recorded except a solitary specimen of *Hibernia leucophaea*.

APRIL 8th, 1915.

Mr. W. J. KAYE, F.E.S., in the chair.

Mr. Stanley Edwards exhibited specimens of the N. American butterfly *Papilio ajax* with its seasonal dimorphic form *telamonides*.

Mr. Brooks exhibited the unopened flower spike of the Butterbur, *Petasites vulgaris*.

Mr. Schmassmann exhibited several specimens of the fine *Papilio homerus* from Jamaica, including a female form showing male coloration, with a series of the Pierid *Hebomoia roepstorffii* from the Andaman Islands.

Dr. Dixey, F.R.S., then read a paper on "Seasonal Dimorphism" and gave numerous lantern and other illustrations. (See page 1.)

APRIL 22nd, 1915.

Mr. A. E. GIBBS, F.L.S., F.Z.S., *Vice-President*, in the chair.

THE EXHIBITION OF ORDERS OTHER THAN LEPIDOPTERA.

Mr. T. B. Foster, of Addiscombe, was elected a Member.

The collection of British Diptera kindly given to the Society by Mr. H. W. Andrews was placed on the table for exhibition by the the Hon. Curator, with seven other drawers from the Society's collections.

Mr. West (Greenwich) exhibited four drawers of his collection of Coleoptera including fine series of British *Carabidae*, a fine varied series of *Notiophilus 4-punctatus*, including sets of the forms *3-punctata* and *5-punctata*, a British example of *Calosoma sycophanta* taken in the Borough Market, two British specimens of *Carabus auratus*, a nice series of *Dytiscus circumcinctus* including 2 ♀ specimens with elytra having the smoothness of the ♂, and a fine series of the very rare species *Micraspis 16 punctata*, which Mr. West once took in abundance in the New Forest.

Mr. Schmassmann exhibited :—

- (1) A fine opal from Mexico with an enclosure of a milky opal.
- (2) An agate stained with a triangular design of layers.
- (3) A fine piece of malachite from Rhodesia.
- (4) Two specimens of agate showing very fine natural colouring.

Mr. Edwards exhibited several cases of large species of Exotic Coleoptera including *Goliathus druryi* from Sierra Leone, *Dynastes hercules* from the Antilles, *Dynastes tityus* from North America, *Strategus semiramis* and *Batocera wallacei* from India, *Heterocomphus schonherri* from Brazil, *Batocera rubus* from Malabar, *Cladognathus servicornis*, *Sagra caerulea* and *Hexodon unicolor* from Madagascar, and *Rhaphidapsis zonaria* from Natal. There were also a pair of the fine *Chalcosoma atlas*.

Mr. H. Moore exhibited a number of scorpions from the Mediterranean region—South Africa, West Indies and North and South America; also the pseudo-scorpion *Thelephonus giganteus* from Florida; the centipede *Scutigera coleoptrata* from Chanak (Dardanelles), and a large bird killing spider (*Mygale*) from the Upper Amazon; also the skin of a West African python which measured, when killed, 16 feet in length.

Mr. W. J. Ashdown exhibited examples of aberrations of the common earwig, *Forficula auricularia*, including specimens with teratological and asymmetrical forms of forceps. One example had extremely well developed forceps, another had them very considerably dwarfed.

Mr. W. J. Kaye exhibited a drawer of the large and conspicuous insects he had met with at various times in South America and especially in Trinidad, including the Coleopteron *Dynastes hercules*, the huge dragon-fly *Microstigma* sp. from British Guiana, specimens of the Lepidopteron-like Hemiptera of the *Flatina* group, the large *Corydalis cornutus*, the huge lantern-fly *Phriatus diadema* from Rio, a bird-killing spider *Theraphosa ariculare* from Trinidad, several very large Phasmids, the harlequin beetle *Acrocinus longimanus* from Trinidad, and the large Longicorn *Titanus giganteus* from British Guiana.

Mr. B. W. Adkin exhibited.—1. Fruit of *Paulownia imperialis* (Sieb. and Zucc.), and of *Catalpa kempferi* (Sieb. and Zucc.). These trees, he said, both come from Japan. Though their seeds so are dissimilar, their leaves and twigs are much alike, and they are often mistaken for one another. Both trees are uncommon in Britain, but can hardly be called rare. They are of unusual but particularly handsome appearance, and grow to a height of, say 30 feet, with spreading branches. The leaves are very large, simple, and spade-shaped. *Paulownia imperialis*, known in Japan as the "Kiri," is the only member of its genus usually seen in Britain. The leaves grow opposite to one another on the twigs, and the tree carries an erect raceme of somewhat variegated purple flowers, exactly similar to a foxglove flower in shape and size. It belongs to the same family as the foxglove, viz., *Scrophulariaceae*. *Catalpa kempferi* has three brothers at least. *C. bignonioides*, the "Indian bean" of the Southern United States; *C. cordifolia*, often called *C. speciosa*, the "Western catalpa" from Western Kentucky, Tennessee, etc.; and *C. fargesii* from China. *C. bungei*, *C. duclouxii*, and *C. teasiana*, a hybrid, are also recorded. The leaves of these trees leave the twig in groups of three, and the flower

is not dissimilar to that of the horse chestnut in appearance. The Catalpas belong to the *Bignoniaceæ*.

2. A witches' broom formed on larch by the fungus *Exoascus turgidus*. This fungus commonly forms witches' brooms on birch, but also at times on chestnut, hazel, hornbeam, alder, cherry, elm, pine, and other trees. Sometimes these brooms are of large dimensions.

3. *Chermes pini*.—The pine aphid, on young Scots' pine, to which it often causes considerable damage.

Mr. R. A. R. Priske exhibited long and varied series of the land molluscs, *Helix aspersa*, *H. arbustorum* and *Cylostoma elegans*.

Mr. Colthrup exhibited a large number of varieties of the eggs of the tree pipit, meadow pipit and skylark, together with a considerable number of clutches of eggs of various species, each containing a cuckoo's egg, and pointed out the apparent resemblance to the egg of the foster-parent in many instances.

Mr. Smallman exhibited :—

(1) A selected series of Blackbird's eggs showing range of color and shape, including one with a very rough and hard shell of dull lavender colour, and one very small egg.

(2) A similar series of Robin's eggs ranging from dark fuscous to pure white.

Mr. Main exhibited the living larvæ of the fire-fly, *Luciola italica*, bred from ova laid in June, 1914, at Lugano. They had fed upon portions of slugs. He also showed a specimen of the Neuropteran *Nemoptera coa* obtained by Mr. Bowman at Cintra.

Mr. Frohawk exhibited an egg of the ivory gull (*Pagophila eburnea*), collected by F. G. Jackson at Cape Mary Harmsworth, Franz Josef Land, August 7th, 1897; previous to this expedition only four specimens of this egg had been recorded; and he also showed a clutch of four eggs of the great or solitary snipe (*Gallinago major*) from St. Petersburg, 23rd May, 1906.

MAY 13th, 1915.

MR. A. E. TONGE, F.E.S., Vice-President, in the chair.

Mr. Leeds exhibited several aberrations of each of the following species :—

A. *Polyommatus icarus*.

(1) *Ab. obsoleta* (only one small spot being present on the under surface); from Herts.

(2) An asymmetrical ♂ aberration approaching *ab. obsoleta*, with the marginal row of eyespots somewhat indistinct; from Hunts.

(3) An underside ♂ with chocolate band across all wings; from Hunts.

(4) An upperside ♂ shot with brilliant metallic blue; from Herts.

B. *Agriades thetis* (*bellargus*).

(1) A female with antennæ malformed, club larger and attached to stem somewhat crosswise; from Kent.

(2) A pair of males with aberrant spotting on undersides; from Kent.

(3) A female with upperside bluish and absence of orange in the marginal eye spots; from Kent.

C. *Canonympha pamphilus*.

(1) A specimen with very dark suffused underside; from Herts.

(2) An underside with small additional ocelli on each forewing and an additional black spot beneath; from Herts.

D. *Agriades coridon*.

(1) *Ab. semisyngnatha*; from Herts.

(2) An underside ♂ with very smoky ground; from Herts.

(3) A male with slaty suffused underside; from Kent.

(4) Two upperside ♀s with khaki streaks; from Herts.

E. *Pararge aegeria*.

(1) The ordinary English form ♀; from Hunts. (This form is rightly, var. *egerides*.)

(2) Two Cornish forms in which the tawny markings were much enlarged in area and very brilliant, thus resembling the form *aegeria* as obtained in the southern countries of Europe.

F. *Epinephele jurtina* (*janira*).

A female with strongly ochreous undersides; from Hunts.

G. *Pieris brassicae*.

An underside female with a pale blue tinge throughout, there being no trace of orange; from Monks Wood, Hunts., Aug., 1908.

Mr. Robert Adkin exhibited a short series of a hybrid between *Biston hirtaria* ♂ and *Nyssia lapponaria* ♀. The males, although they in size and shape closely approached the male *N. lapponaria*, had the wings well clothed as in the male *B. hirtaria*, and their markings in two out of three specimens most resembled that species, but in the third they were nearer *N. lapponaria*, but more densely scaled. The females had aborted wings, in general facies

very like those of the hybrid *N. zonaria* ♂ and *B. hirtaria* ♀. The specimens were reared by Mr. G. Harrison of Birtley.

Mr. H. Moore exhibited a specimen of *Acherontia* (*Manduca*) *atropos* from South Africa, sent to him by post enclosed in a letter. It was in excellent condition. It was remarked that the other two species of the genus, *A. styx* and *A. lachesis*, were eastern in their distribution.

Mr. Curwen exhibited long series of *Polyommatus eros* ♂s and *Laticlona orbitalis*, the former from Saas Grund, and the latter from the Grisons area. Both Mr. Gibbs and Mr. Hy. J. Turner had met with the two species at St. Moritz, Engadine, and the latter remarked on the drinking habit of the former species, which he had frequently seen rise from patches of moisture on the road in small clouds as he passed.

Mr. B. S. Williams exhibited living larvæ of *Odezia atrata* feeding on *Cytisus*, and a series of *Xanthorhoe* (*Melanippe*) *fluctuata* showing much variation in ground colour, one example was very clear of the indefinite markings on the ground, while at the other extreme was a form approaching ab. *neapolisata*. Both exhibits were from Finchley.

Mr. Cowham exhibited a number of specimens he had obtained in Argentina:

(1) Several large Psychid cases, which he stated were abundant in many parts of the country on the branches of trees. (They were afterwards found to be cases of *Oeketicus platensis*).

(2) A large and conspicuous species of "Skipper" with a light transverse band across the disc of all four wings, upper- and under-sides and a brilliant red tip to the abdomen. (It was afterwards found to be *Enides phænicola*).

(3) Specimens of *Colias lesbia* var. *pyrrhothea*, one of the few stragglers of the genus which penetrates into the Neotropical Region. Mr. Cowham stated that there was a lighter form which corresponds to our ab. *helice* of *C. edusa* but that it was quite uncommon. It is known as ab. *heliceoides*.

(4) An example of an Arctiid *Epanthera indecisa* ♂.

Mr. Step exhibited some examples of Fulgurites, the remarkable tubes formed by the passage of lightning through sand, when the siliceous grains become fused and form a primitive kind of glass. For these specimens he was indebted to Mr. J. H. L. Atkinson, H.M. Vice-Consul at Cuyaba, in Brazil. Readers of Darwin's "Voyage of the Beagle" would remember his description of the finding of such tubes in "a broad band of sand hillocks which

separate the Laguna del Potrero from the shores of the Plata, at the distance of a few miles from Maldonado." The exhibitor considered that a particular interest attached to his specimens because they had been obtained from the small area of sand described by Darwin more than eighty years earlier. At that date fulgurites were little known—they can scarcely be said to be well-known at the present time—and Darwin refers to some that had been found at Drigg, in Cumberland, which had been described in vol. ii. of the Geological Transactions. In recent years they have been found also in a district in Poland, but they do not appear to have become common objects anywhere. This fact probably indicates that special qualities of sand or local conditions favour the fusibility of the grains. It is believed that the tubes are cylindrical when formed, but that their shape is altered by local pressure before cooling takes place.

Mr. J. Platt Barrett exhibited series of *Thais polyxena*, *Leucochlœ* (*Pontia*) *daplidice*, *Euchlœ* (*Anthocharis*) *belia* (*crameri*) and *Anthocharis* (*Euchlœ*) *cardamines* and contributed the following notes:—

"I am showing four species of butterflies, which may be termed "variable," in fact with them "variation is the rule" and not the exception, and after careful examination it would be probably correct to say that no two specimens are exactly alike. A small dot may be enlarged, a blotch altered in shape, colouring slightly altered and so on; yet on the whole there remains a wonderful uniformity in the 65 specimens comprising this exhibit.

(1) *Thais polyxena* is a very striking species and should show at least one of the abnormal forms, var. *rumina*, with extra red spots, var. *cassandra* blacker, ab. *ochracea* dark instead of light yellow, ab. *meta* red spots replaced by yellow, or ab. *bella* the third costal spot reduced in size, but only one of my specimens differs a little and may approach ab. *ochracea*. I have only met with *L. polyxena* on one slope in Sicily, and this may account for getting no varieties.

(2) *Leucochlœ* (*Pontia*) *daplidice*.—A new genus has recently been created for *daplidice* and another species, and is differentiated from the ordinary "whites" (*Pieris*) by the sub-costal vein, which has three branches (*Pieris* has four and *Anthocharis* five). Certainly *daplidice* seems to agree more closely to *Euchlœ* (*Anthocharis*) *belia* (*crameri*) than to *Pieris* or to *Anthocharis*, and it would not do much harm if the *Leucochlœ*s and the *Euchlœ*s were combined in one genus. *L. (P.) daplidice* is very common both in Sicily and in Calabria and two so-called abnormal forms are shown, (1) var. *bellidice* the spring form, which is smaller and darker green, and

(2) var. *raphani* the summer form, with underside of hindwings yellowish instead of green. Perhaps there is also ab. *anthracina* white darkened by black scaling. Examples taken in the South of England rarely reach the size of the Sicilian summer form.

(3) *Euchloë* (*Anthocharis*) *belia* (*crameri*).—When Cramer figured *belia* about the year 1790, his type specimen was a female he had received from Smyrna and his object was to differentiate it from a female *cardamines*, and he adds I do not know if the males have also an orange coloured blotch (*tache*) on the forewing as that of the just mentioned *cardamines*. However, the name *belia* has withstood all the efforts of the nomenclature revolutionists. [This is not so. Dr. Verity has conclusively shown (1913, *Jrn. Linn. Soc., Zool.*), that we should call this species *crameri*. This our nomenclature committee has confirmed.—H.J.T.] I have to thank Mr. Turner for kindly letting me examine his *Euchloës* for varieties and abnormal specimens. Var. *ausonia* is said to be the summer form of *belia*. These which I exhibit belong to the two broods, but in no case can I find the silvery spotting on the underside, which is said to distinguish *belia* from *ausonia*. Altogether there are five forms of *belia* said to occur in Sicily and South Italy, var. *ausonia* the summer form, ab. *romana* a transition from *belia* to *ausonia*, ab. *krügeri* broader greyish-black apex to forewing and underside of hindwing sharply marked with dark green and white, ab. *trinacriae* apex strongly spotted with white and underside of hindwing showing strongly developed white spots, and ab. *matutia* only small white spots in black area of forewing the middle black spot being very large and underside of hindwing showing only a few small white spots. My specimens are from a wide area, ranging from sea-level to over 5,000 ft. up, the small specimen, ab. *minor* we might call it, was captured at Motta St. Anastasia, on the plain of Catania, where the River Simeto flows very sluggishly to the sea.

(4) *Anthocharis* (*Euchloë*) *cardamines*.—I apologise for showing these specimens as they have been shewn before. I am very fond of the small race found on Mt. Etna, which at its "dwarfist" extends no more than one inch and one line. Apparently the central spot varies much in size. A dwarf form has been named ab. *hesperidis* by Newnham and ab. *minor* by Cockerell. A southern form with orange patch reaching only to the black median spot has been named ab. *turritis*. Seitz's description of *cardamines* says "the average red patch does not reach much further than the discocellular spot" and I have put in several specimens which agree with this description from various parts of Italy. In addition I

have added a form from Kandersteg, where the orange patch extends beyond the spot, which is small; a Kent specimen with extended orange, and a Hampshire specimen with limited orange."

Mr. Dennis exhibited photographs of a recently differentiated species of Ant, *Formica pratensis*, which was closely related to the well-known species *F. rufa*.

Mr. Stallman exhibited a remarkable specimen of *Taniocampa gothica* ♀, with right underwing reproducing the markings of the forewing, but rather confused by streaks towards the apex of the wing of the normal underwing colour, the markings are also rather cramped up owing to the small size of the wing, it being slightly smaller than usual and of a somewhat different shape. The under surface of the wing is quite normal, with the central dot. It was taken at "sallow" at Holmwood, on April 4th of the present year.

Mr. B. W. Adkin exhibited the following specimens of Lepidoptera from Loch Lomond taken in 1914:—

Cænonympha pamphilus.—Undersides of the females suffused with white. The spots opaque. The males very dark. Specimens from S. England for comparison, one of which had an extra spot on the forewing.

Brenthis selene.—A dark suffused female. A specimen from S. England for comparison.

Diacrisia sannio.—A dark suffused male of large size. A specimen from S. England (Tilgate Forest) for comparison of the usual S. England small form, but with a minimum of suffusion in hindwings.

Mr. Adkin remarked that Lepidoptera were plentiful on the banks of Loch Lomond and evidently interesting—but he had little opportunity for collecting there. Other species noted included *Acidalia fumata*, *Cabera pusaria*, *Eulype hastata*, *Xanthorhoë sociata*, *X. tristata*, *X. montanata*, *Iodis lactearia*, *Camptogramma bilineata*, *Lomaspilis marginata*, *Hamaris tityus*, etc. The specimens of *C. pamphilus* and *D. sannio* appeared to be typical of the local forms, but the *B. selene* exhibited was the most suffused of a large number taken and observed.

Mr. Sich then read a short paper, "Notes on *Tortrix viridana*." (see page 15.) In the discussion which ensued it was remarked that a specimen or two representing a second brood had occasionally been met with. As a remedy against the depredations of this pest, it was stated that probably spraying was the most effective. Mr. Adkin noted that on one occasion at Chattenden he had found

a considerable number of pupæ of the species in spun-up leaves of honeysuckle, growing beneath an oak which was absolutely denuded of its foliage by the larval attack.

MAY 27th, 1915.

Mr. Alfred Sich exhibited ova of *Tortrix viridana*, laid in pairs and covered with scales from the parent, in the rough bark of oak. He also showed the cases and young larvæ of a *Solenobia*, possibly *lichenella*. Only females were observed. The cases were three-sided. The pupa thrusts itself partly out of the case before emergence. The female begins laying eggs immediately after getting free from the pupa skin. The eggs are laid not in the pupa shell, but in the case. The larvæ hatched in about four weeks after the eggs were deposited. The cases were found at Barnes.

Mr. H. Moore exhibited a number of Lepidoptera he had recently received from Johannesburg, South Africa, including *Hypolimnas misippus*, the female of which is almost indistinguishable from its "model" *Limnas chrysippus*; *Precis sesamus*, a member of a genus whose species are remarkable for their dimorphic and polymorphic forms; *Colias electo*, the South African representative of our British *Colias edusa*, and its dimorphic white female var. *aurivillius*; the common "swallow-tail" of South Africa, *Papilio demodocus*; the small forms of *Pyrameis cardui*, which are characteristic of the southern race; *Hippotion celerio*; and the beautiful deep green Sphingid *Basiothia media*.

Mr. B. S. Williams exhibited a number of larvæ of *Xylophasia scolopacina* taken near Finchley, and a series of *Tricopteryx* (*Lobophora*) *polycommata* from Yeovil, Somerset.

Mr. Lachlan Gibb, on behalf of Mr. H. M. Simms, of Stourbridge, a fine suffused aberration of *Pyrameis huntera*, a dwarf specimen of the same species with the typical form for comparison, all from Montreal, Canada, taken in 1913; a specimen of *Bithys quercus* ab. *bellus*, in which a small orange patch is present in the disc of the forewings, taken near Barmouth in August, 1910; and an aberration of *Pharetra* (*Acronicta*) *menyanthides*, in which the orbicular stigmata are absent, taken near Sheffield in June, 1912.

Mr. Priske exhibited an example of the Coleopteron *Morica planata*, a Tenebrionid from Gibraltar.

Mr. E. J. Bunnett read a short paper entitled "The Maple Aphis," and illustrated his notes by drawings and lantern-slides. (See p. 21).

In addition, a few other lantern-slides were shown by Mr. Bunnett, including the pygmy nest of the shrew mouse in an open field; an *Zygænid* with the pollinia of an orchid attached to its head; the noctule bat, the largest British species; and a series showing the slough of a newt.

MAY 29th, 1915.

FIELD MEETING AT RANMORE COMMON AND PICKETT'S HOLE.

Leader.—HY. J. TURNER, F.E.S.

The morning party took the well-known road to Bagden Farm, turned in the gateway of the footpath to Ranmore, and spent some time in the hollow between the woods. Thence the little frequented path along the foot of the northern slope of the woods was taken past the lonely Tanner's Hatch Farm, subsequently at some considerable distance further on, a south-westerly traverse of the woods was taken which brought the party out on to the centre of Ranmore Common. This was crossed and a footpath leading through the woods to the crest of the chalk escarpment was taken, from whence a gap in the fence led by a dark overhanging private way to the top of the prominent hill which dominates the great hollow known to entomologists as Pickett's Hole. Here a halt was called for a meal, in view of the long Holmesdale Valley below and the range of sand hills opposite, which culminates in the tower crowned Leith Hill. On the opposite slope of the Hole other members of the party were espied and afterwards met. The steep declivity was negotiated, and the hollow and the slopes leading from it were well-searched for *Zygana trifolii* and *Agriades thetis*, but with little success, only one or two examples of either species being obtained, although later on a restricted area further east produced the latter species in absolute abundance. The afternoon party joined the others on these slopes and a total attendance of considerably over twenty was attained. Unfortunately the day was by no means bright, and slight showers were experienced, the return home being in very cool air.

Very few results of the meeting have been sent on to me, and the usual possibilities of the area are pretty well-known to our members. Possibly the most useful species in the morning was *Drepana unguicula*, which was beaten in some numbers from the beeches on the northern slope. Just previously, in the hollow

between the woods, *Hamearis lucina* was met with. Mr. Ashdown and others report *Bapta temerata* and *B. bimaculata*, with *Hylophila prasinana* and *Nemophora schwarziella*. Mr. Dunster says that he found *Polyommatus icarus* fairly common on the slopes and in the hollow. Among them he took three specimens of the ab. *arcua*, ♂ s. On the way back to tea he met with *Asthena candidata*, *Cabera pusaria*, and *Lomaspilis marginata*, and subsequently after tea, besides *A. thetis*, saw some numbers of *Acidalia ornata*. Mr. Stallman reports that he found the nests with eggs of the Chaffinch, Chiff-chaff, and Meadow Pipit, and also a few *Ephyra annulata* were procured by Mr. Dunster and himself nearer Dorking by beating the hedges of maple. Among the Tortrices Mr. Sich took *Cacœcia musculana* and *Eulia ministrana*, while specimens of *Euchromia purpurana* and *Phtheochroa rugosana* were obtained on the steep slopes of the hollow. Among the Tineids Mr. Sich reported *Glyphipteryx fischeriella*, *Spuleria aurifrontella*, *Ornix avellanella*, *Nepticula floslactella*, and *Micropteryx thunbergella*.

JUNE 10th, 1915.

MR. A. E. GIBBS, F.L.S., *Vice-president*, in the chair.

It was announced that two members of the Society had been killed in action in France, Mr. W. W. Penn-Gaskell, who joined the Society in 1905, and Mr. W. D. H. Gotch, who joined in 1914.

Dr. Chapman exhibited a living specimen, bred from the egg, of *Polyommatus escheri* var. *rondoui*, from Gavarnie in the Pyrenees. It emerged on June 10th.

Mr. Hy. J. Turner exhibited the whole of the coloured plates of Herbst and Jablonsky's "Natursystem aller bekannten in- und ausländischen Insecten," vols. i. to x., Coleoptera, which had been found exposed for sale on a barrow in the street and bought for 5/-. He stated that these two authors were the first to place the whole of the known Coleoptera and Rhopalocera in accordance with the Linnean System. There were in all 177 plates.

Mr. B. S. Williams exhibited a short series of *Selenia bilunaria* (*illunaria*) from Yeovil. One female was unusually strongly marked and a male was of an extreme smoky brown coloration. He also showed larvæ of *Anticlea badiata* from ova laid by a female taken at Yeovil, a red-brown *Agrotis nigricans* from Wicken and a black form from St. Anne's, with a perfect specimen of *Mimas tilia*, which had emerged from a pupa which had been crippled.

Mr. Dennis exhibited several photographs with the stereoscope, including *Hispida atra* a spinous coleopteron, *Formica pratensis* a newly described British ant, and sprays of Laburnum and Spiræa.

Mr. J. Platt Barrett, a bred living specimen of *Strymon pruni* which had emerged on June 10th. It was generally considered as an early date for the emergence of the species although Mr. Leeds stated he had met with one or two specimens in early June, but not the bulk of the emergence. Mr. Curwen stated that the species was early in emergence at Eclépens, Switzerland.

Mr. Dunster exhibited a series of *Brenthis euphrosyne* taken at Gerrard's Cross, Bucks, in late May.

Mr. B. S. Williams reported that he had recently noticed the buzzing noise made by *Hylophila prasinana* in flight. He compared the noise to that of a beetle humming. A number of specimens came towards his lantern and in each case the noise was apparent from some distance. Several members stated this phenomenon had been previously reported, but no one present had had a similar experience.

Mr. B. W. Adkin read some extended notes on *Pachygastris trifolii* and on *Ruralis betulae*, with more particular reference to the phases of variation and aberration which he had met with in the two species. He exhibited the following forms:—

Ruralis betulae: ab. *restricta*, ab. *restricta-lineata*, ab. *lata*, ab. *lata-lineata*, ab. *fisoni* (asymmetrical), ab. *cuneata*, and an unnamed aberration in which there was an almost complete orange border to all the wings with much orange suffusion.

Pachygastris trifolii: ab. *flava*, ab. *obsoleta-flava*, ab. *pallida-flava*, ab. *medicaginis*, ab. *virgata-medicaginis*, ab. *ratamæ*, ab. *cerrina*, ab. *unilinea-typica*, ab. *suffusa-typica*, ab. *rufa*, ab. *contracta-rufa*, etc.

Typical forms of the species shown, for comparison.

He said: "From time to time, I have dipped into those marvellous volumes "British Lepidoptera" by the late J. W. Tutt. Under the heading "Variation" I find long descriptions of many forms of almost every insect with Latin names attached. As a collector, I desire to catch or breed all of those forms. I may or may not approve of an attempt to give Latin names to such forms. I may possibly find that there are so many intermediate specimens that the forms may be said to run into one another. I have found in several cases, where my series of species is sufficiently extensive, that the more extreme specimens appear to represent, or closely approach, the forms which are so ably described. I am exhibiting a few specimens of *Ruralis betulae* female to illustrate my meaning.

"Six forms of this are described in the book.

1. With narrow orange patch crossed by black nervures, ab. *restricta-lineata*, n.ab.

2. With broad orange patch crossed by black nervures, ab. *lata-lineata*, n.ab.

3. With narrow orange patch not crossed by black nervures, ab. *restricta*, n.ab.

4. With broad orange patch not crossed by black nervures, ab. *lata*, n.ab.

5. The orange markings yellowish in colour, ab. *fisoni* (Wheeler).

6. With sub-marginal series of interneural orange streaks in hind-wings pointing towards base, ab. *cuneata*, n.ab.

"These forms, or something approaching them, are shown in my box. There is also another specimen which I cannot place under any of the above names, and which I think may be a rare if not a unique variety. It has almost a complete orange border to all wings and much orange suffusion.

"*Pachygastria trifolii*.—Tutt divides the forms of this insect that are found in Britain into five groups, depending on ground colour.

1. Ground colour pale yellow, ab. *flava*.

2. " " yellow-grey or buff, ab. *medicaginis*.

3. " " fawn-grey or reddish-grey, ab. *cervina*.

4. " " reddish-brown, *trifolii* (Esp.).

5. " " deep foxy red-brown, ab. *rufa*.

"On looking over a number of specimens this division appears to be fully justified. The further sub-divisions are less numerous in some cases than in others, but there is little doubt that specimens could be found in each division, if the insect were sufficiently abundant, which would show—

(a) All the wings unicolorous and without markings (except presumably the white spot).

(b) The forewings with two transverse lines, including a more or less defined median band.

(c) The median band in forewings more or less contracted.

(d) Ill-defined transverse lines, but well marked longitudinal nervures.

(e) The basal line obsolete.

"It would be a good collection that exhibited all these subdivisions of each shade of ground colour. My own falls sadly short of it, and even Tutt's division fails to give many of them, perhaps some of them have not yet been observed. It is not necessary to trouble you further with named aberrations or those for which

names have been suggested. I have selected specimens from my collection which seem to resemble some of those described by Tutt, and have attached to them some of the names he suggests.

"What is, to me, more interesting is local variation. With regard to this Tutt suggests two distinct races. (1) The ordinary dark red-brown form characteristic of the central European races, (2) a distinct yellow race approximating to the extreme southern (Lambessa) and eastern Russian and Asia Minor forms.

"The former appears to be the general type from the coasts of Lancashire, Cheshire, Devon and the heaths of the New Forest, whilst the latter appears to be confined to the Kent and Sussex coasts between Dungeness and Beachy Head.

"So far as my experience goes I quite agree with these views, but I am disposed to think that the specimens from Lancashire and Cheshire differ considerably from those of the south-western counties, and that soil and situation do much to lead to local variation.

"Up to the present I have been unable to fully confirm some of the views I have formed, but I shall be very grateful for help in the matter.

"I have brought *Pachygastria trifolii* for exhibition largely on account of the more simple division of the forms than Tutt has favoured us with as compared with the other *Lachneides*. I should warmly welcome exhibitions and discussions upon other members of the group, and would, if my time allows, do my best to assist them."

JUNE 19th, 1915.

FIELD MEETING AT OTFORD, KENT.

Leader.—ROBERT ADKIN, F.E.S.

The portion of the southern escarpment of the North Downs adjacent to the village of Otford has already formed the rendezvous for our Field Meetings on more than one occasion, and considerable lists of insects, etc., noted there have been published ("Proc.," 1903, p. 47, 1912, p. 96). It will therefore be necessary in the following report to mention only such species as have not been previously recorded, or those that some special circumstance makes it desirable to again refer to them.

A morning party took train to Shoreham, and following a foot-

path on the left soon after reaching the main road, worked their way along the side of the Down in the direction of Otford; in the course of their ramble meeting, among other things, with a small colony of *Agriades thetis* (*bellargus*) and a wasted specimen of *Cupido minimus*. The afternoon party reached Otford station soon after three o'clock, where the members of the earlier party were awaiting them, and a start was at once made for the downs. Some took the path by the side of the "kennels," and in a field near the top of the hill met with the pupæ of *Zygaena filipendulæ* in great profusion on the grass stems, and from one of these a five-spotted form was reared, but it was noted later that where the species occurred on the low ground at the foot of the Downs the larvæ were not full-fed. Having gained the Kingsdown road a start was made in the direction of that village, with the intention of turning down through the woods and joining up with the other members of the party at the chalk-pit, but as it was found that a large part of the district was under military control, and that anyone found wandering was liable to arrest, it was thought to be prudent to return by the lane to the Kemsing road, and in that way join the other members. This brought us along the half mile or so of a low park paling, on which were found at rest quite a number of *Hecatera serena* and a specimen each of *Cucullia umbratica* and *Hepialus lupulinus* and so on to the little bit of still-open down by the chalk pit, where the remainder of the afternoon was spent. From reports which several of the members present were good enough to send me a note of, the following among many other species were taken, *Pyrameis cardui*, a solitary worn specimen was seen flying over the top of the hill, *Bithys quercus* and *Callophrys rubi* met with sparingly, *Augiades sylvanus* in some numbers, and *Euclidia glyphica* fell to the lot of the morning party. *Acidalia subsericeata*, *Anticlea nigrofasciaria* and *Crambus chrysonnchellus* occurred sparingly. A rather well-marked form of *Oxyptilus heterodactyla* (*tencrui*), *Mimæseoptilus fuscus* (*pterodactylus*), *Peronea aspersana*, *Sciaphila virgaureana*, and *Catoptria hypericana* were all more or less abundant on the short herbage. Perhaps the most interesting capture of the day was that by Mr. Sich of *Anacamptis coronillella*, a species previously recorded only from Surrey; the present specimen, the identification of which has since been fully verified, thus proving a new record for the county of Kent. Mr. Sich further reports that a couple of pupæ spun up in leaves of maple produced *Tortrix viridana*, but adds that some oak trees were not far distant, and that some larvæ in rolled willow leaves produced the grey form of *Tachyptilia populella*, also that

among his captures were *Ptycholoma lecheana*, several *Butalis senescens*, and a few *Micropteryx seppella*, while Mr. Turner closes the list of small fry with *Chrysoclista aurifrontella*.

The day had been very fine and warm, and by half-past six the members were glad to adjourn to the Bull Hotel in Otford village, where a meat tea was awaiting them, to which just a dozen sat down, and at its conclusion the meeting was brought to a close.

JUNE 24th, 1915.

Mr. Fagg, of Lewisham, was elected a member.

Mr. Stanley Edwards, on behalf of Mr. G. Dawson, exhibited the following remarkable aberrations of European butterflies:—

Polyommatus escheri, underside, in which the whole of the sub-marginal black spots were considerably, but not uniformly, elongated.

Melitaea dictynna, underside, nearly the whole of the markings on the hindwings were elongated and much confused, while those on the forewings were much suffused and unrecognisable. The upperside of this specimen was almost wholly black with a light sub-marginal narrow band to forewings as the only easily apparent marking.

Brenthis pales, upperside, very suffused, scarcely a trace of the usual definite black spotting on the forewings, quite comparable to the race found in the Heuthal, Bernina Pass. The underside was quite normal in marking and colour.

Epinephele jurtina, a xanthic form, with hindwings almost wholly pale and forewings largely pale in colour.

Polyommatus hylas, underside, with the outer marginal areas on all the wings very uniformly pale in colour, the orange eye spots very strongly emphasised, and the rest of the markings very clearly developed.

Melitaea didyma, underside, with nearly all the markings elongated.

All but the last species came from the Rhone Valley, Switzerland; the last came from Digne. (See Plate I.)

Mr. Edwards also exhibited nests of the humble-bee, *Bombus lapidarius*, from which the perfect insects were emerging. They were obtained a day or two before in Worcestershire.

Mr. W. West (Greenwich), exhibited the following uncommon species of Coleoptera taken by him in late May and early June in the New Forest:—

Leptura scutellata, *Mesosa nubila*, *Anoplodera sexguttata*, *Grammoptera praeusta*, *Clytus arietis*, *Anitys rubens*, *Elater sanguinolentus*, *Elater miniatus*, *Trachys troglodytes*, *Agrilus viridis*, *Colydium elongatum*, *Thymalus limbatus*, *Ips 4-guttata*, *Ischnomera sanguinicollis*, *Aphodius niger*.

Messrs. B. W. Adkin, R. Adkin, Hy. J. Turner, A. E. Gibbs, and F. W. Cowham, exhibited series of *Lasiocampa quercus* and Mr. B. W. Adkin subsequently read notes on the species.

Mr. Gibbs showed a male with complete female coloration from the New Forest.

Mr. Cowham exhibited a female which was bred from a larva taken at Epsom. It was two years in pupa, emerged in May and was of the form *var. callunæ*. He also showed a specimen in

The Society is indebted to the kindness of Mr. W. G. Dawson, F.E.S., of the Manor House, Upper Wick, Worcester, one of our Life-members, for the coloured plate, which illustrates the exhibit on the opposite page and forms the frontispiece to the present volume.

THE SOCIETY WISHES TO THANK THE SOCIETY OF ENTOMOLOGISTS FOR THE PRESENT OF THE SPECIMENS OF *Lasiocampa quercus* AND ITS VARIETY *callunæ*.

Mr. B. W. Adkin read the following notes on his exhibit:—

“At our last meeting I exhibited specimens of *Pachygasteria trifolii*, showing a range of ground colour from palest yellow (ab. *pallida-flava*) to deep foxy red-brown (ab. *rufa*). That insect is, I think, the most variable of all the *Lachneides*. To-night I am exhibiting specimens of another species of the same family for the purpose of tracing a similarity in variation of ground colour, and I am pleased to say several members are supporting.”

“*Lasiocampa quercus*.—With regard to this species Tutt states that “the study of the variation is exceedingly interesting and difficult.” I am in entire agreement with this statement. “Besides colour aberrations, in which individual specimens may vary from the dark chestnut brown of the most extreme male forms to the yellow of the female forms, the character of the pale transverse band also varies from a narrow line to a wide band that may spread to the outer margin of the wing, and offers a basis of variation for a great

among his captures were *Ptycholoma lecheana*, several *Butalis senescens*, and a few *Micropteryx seppella*, while Mr. Turner closes the list of small fry with *Chrysoclista aurifrontella*.

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Mr. Cowham exhibited a female which was bred from a larva taken at Epsom. It was two years in pupa, emerged in May and was of the form var. *callunæ*. He also showed a specimen in which the conspicuous white discoidal spot was duplicated on the left forewing.

Mr. Robert Adkin also exhibited long series of *Lasiocampa quercus* from Scotland and North and South England, the most remarkable specimen being a gynandromorph in which the wings and antenna on the left side were normal male, while on the right side the antenna was normal female, but the wings, although of female size, were of male coloration, and in the hindwing the usual pale band was practically absent. He said that it was many years since he had reared this species in any numbers, but he well remembered that the conclusion he then came to was that there was no clear dividing line between *L. quercus* and its variety *callunæ*.

Mr. B. W. Adkin read the following notes on his exhibit:—

"At our last meeting I exhibited specimens of *Pachygastria trifolii*, showing a range of ground colour from palest yellow (ab. *pallida-flava*) to deep foxy red-brown (ab. *rufa*). That insect is, I think, the most variable of all the *Lachneides*. To-night I am exhibiting specimens of another species of the same family for the purpose of tracing a similarity in variation of ground colour, and I am pleased to say several members are supporting."

"*Lasiocampa quercus*.—With regard to this species Tutt states that "the study of the variation is exceedingly interesting and difficult." I am in entire agreement with this statement. "Besides colour aberrations, in which individual specimens may vary from the dark chestnut brown of the most extreme male forms to the yellow of the female forms, the character of the pale transverse band also varies from a narrow line to a wide band that may spread to the outer margin of the wing, and offers a basis of variation for a great

number of local forms, which are often further specialised by a marked increase or decrease in size." No less than 40 pages in Tutt, some of them in extra small print, are devoted to a discussion upon the variation of this species, and varietal names abound. To deal with these pages, at a meeting of this kind, is impossible, so I have contented myself with showing a few specimens from my collection to illustrate variation in ground colour, and variation in the character of the transverse line.

"With regard to variation in ground colour, Tutt gives for males (a) reddish ferruginous; (b) chestnut-brown; (c) deep purplish or chocolate-brown; (d) russet-brown.

For females (a) yellow or pale yellow ochreous; (b) dull ochreous; (c) faint reddish-ochreous; (d) brown.

I have failed to separate these colours, they may be represented among those I am exhibiting.

"With all these shades of ground colour there are many varieties possible. These appear to be mainly as follows:—

MALES.—1. With narrow almost straight line to forewings and narrow line to hindwings.

2. With narrow curved transverse bands to wings.

3. With broad transverse lines to wings.

4. With normal band to forewings, but the band of hindwings extending to outer margin.

5. With transverse band to fore- and hindwings extending to outer margin.

6. With yellow blotch to base of wings.

FEMALES.—1. Unicolorous with no transverse markings.

2. With pale transverse band crossing fore and hindwings.

3. With outer area of hindwings paler to margin.

4. With outer area of fore- and hindwings paler to margin.

My exhibit is intentionally arranged to show:—

1. Males—Variation in ground colour.

2. Females— „ „ „

3. Varieties.

4. Females—Variation in markings.

5. Males— „ „

"I find that the rows intended to show difference in ground colour and those showing difference in marking could almost be transposed.

"As to the varieties:—

Nos. 1 and 2 are males of small size. No. 1 is curiously melanic.

No. 2 pale for a male.

No. 3 has absolutely no markings on the hindwings, is exceptionally dark in colour and the transverse line on the forewings is unusually small and faint.

No. 4 ♂ and No. 5 ♀ are somewhat scaleless forms without markings on hindwings.

No. 6 ♀ is quite an unusual colour, the white spot is small, the transverse line very slight in forewing and absent in hindwing.

No. 7 ♀ is the most uncommon variety in my collection. The white spot is exceedingly close to the transverse band. The contrast between the rich red of the ground colour and the pale yellow margin is very striking.

No. 8 ♀ is of dull brown colour, with obscure transverse lines and very pointed forewings.

No. 9 ♀ is a pale well-marked specimen, the left forewing being very rounded in shape.

No. 10 ♀ is the largest specimen in my collection.

The entire drawer fails to show fully the variation that occurs in this species. Even my own comparatively weak collection contains very many specimens that are equally worth a place in the drawer.

"Before leaving the consideration of this species, I should like to say a few words upon the suggested division into *L. quercus* and var. *callunæ*. Many of our entomologists desired to separate them as species. In any case the division is of long standing. Personally I experience difficulty with it. Although I fear the subject is rather thread-bare, I hope I may be allowed to take up a few minutes of your time.

"*L. quercus* is the "Oak Eggar," var. *callunæ* the "Northern Eggar." I do not know the northern limit of *L. quercus*, but it extends to Yorkshire and Lancs. Var. *callunæ* is the usual form in Scotland, Ireland and upon the moors of North, Central and South West England. *L. quercus* under all usual conditions completes its life history in one year, hybernating as larvæ and emerging in late July or August. Var. *callunæ*, in the North, takes two years to complete its life history and emerges in June, but in the South it frequently appears to take the *quercus* habit. On the New Forest heaths and the moors of the Lynmouth district of Devonshire, it has been observed sometimes to take one year and sometimes two years to come to maturity. In the Isles of Scilly it appears to mature in one year, invariably.

"As regards the appearance of the imago, the main distinction is, perhaps, that the transverse bands in *L. quercus* are directed towards

the abdomen especially in the hindwings, but in var. *callunæ* they are directed towards the anal angle of both wings. I cling to this as a real distinction, which can be readily seen, though I must confess that there appear to be intermediate forms. It is asserted that in *L. quercûs* the antenna have 64 joints and in var. *callunæ* 84. This is not seen without a microscope, I offer no opinion upon it. If it is true, it is a really valuable distinction.

"Several other differences are suggested. I have found them all indefinite. Though many are correct in the majority of cases. Shortly, these are as follows:—

"*L. quercûs*, both males and females are paler in colour, show no white spot on the underside, have wing nervures of the same colour as the transverse band, and no basal patch to forewings.

Var. *callunæ*, both males and females are darker in colour, show a white spot on the underside, have wing nervures darker than the transverse band, and have a basal patch to the forewings.

"Even my own series show plenty of cases, where none of the last-named distinctions hold good. I hope to hear many views upon the distinction of the two forms."

Mr. R. Adkin remarked on var. *callunæ* that he agreed that there was evidence of two races running side by side just as had been suggested in the case of *Tephrosia biundulata* and *T. crepuscularia*. Possibly there was a species in the making.

Mr. Brooks made some remarks upon the habits of *Hyria muricata* (*auroraria*) as observed by him at Wicken during his visit in mid-June of this year and on other occasions. It was generally stated that the species was obtainable in any numbers only at dawn, which was believed to be its time of flight. He had found it very common at mid-day during this period, and on the first day when there was no wind and without disturbing the herbage, etc., it was possible to take several with one sweep of the net. *Ematurga atomaria* was flying at the same time, and both were about equally common and easy to catch. There were, however, no females taken by either himself or his companion. Two days later, when there was considerable wind, he netted two specimens and commenced to search for females by disturbing the growth beneath bushes from whence he had observed males rise on the previous day, and was successful in obtaining a good number of examples. The species was apparently quite abundant there this year.

Mr. Adkin said that the species was uncertain in its appearance in the New Forest, and then generally in the evening and at dawn. Other members had met with it in the day-time.

Mr. B. H. Smith reported that among species taken at light in the Cornwall district he had met with a number of *Pyrameis atalanta*. Mr. R. Adkin said that one of his early observations was the appearance of *P. atalanta* at light. It was suggested that the species was on migration.

JULY 3rd, 1915.

FIELD MEETING AT SWINLEY WOODS, ASCOT.

Leader.—B. S. CURWEN.

The weather was all that could be desired and there was a good attendance, a muster of twenty-five. On the way from the station to the woods Mr. Turner loitered behind and became boisterously involved in an argument with the irate owner of a fence, which he was examining from an entomological standpoint. This irascible individual accused Mr. Turner of being about to make an inscription on his fence, but whether this was of a scriptural, political, or even convivial nature did not transpire. After a considerable mutual exchange of vituperation peace was at length declared, and Mr. Turner continued his investigation unhindered. This fence is usually tenanted by numerous Tortrices and Tinea, generally common species; all of those taken have been reported on a previous visit.

On arrival at the ground *Argynnis adippe* was found to be in considerable abundance, flying rapidly over the heather patches near the brickfield. The flight of this species, however, was quite different over some rough ground in process of clearing and covered with brushwood. Here the butterfly fluttered quite close to the ground and was difficult to net on account of the abundance of the brushwood. Mr. Sperring captured a striking variety with a much suffused upperside.

Later in the day the party went to that part of the woods in which *Limenitis sibylla* and *Dryas paphia* occur. Of the former species only one specimen was taken, evidently just emerged, and one or two examples of the latter.

As usual in these woods at this time of year the butterflies were the principal entomological feature, and the following species were reported: *Pieris brassicae*, *P. napi*, *P. rapæ*, *Brenthis selene*, *Argynnis adippe*, *Dryas paphia*, *Aglais urticae*, *Pyrameis cardui*, *Limenitis sibylla*, *Pararge megæra* (very worn), *Epinephela jurtina*, *E. tithonus*,

Aphantopus hyperantus, *Cænonympha pamphilus*, *Bithys quercus*, *Callophrys rubi* (not very worn), *Plebeius ægon*, *Polyommatus icarus*, *Adopæa flava* (*thamias*), and *Argiades sylvanus*.

The afternoon was extremely hot, and some of the party indulged in a paddle in one of the numerous ponds deserted by the brickmakers, much to the disgust of a water vole which sought refuge in flight.

Among the Heterocera the following species were reported.—*Zygæna trifolii* (a form intermediate between the large *palustris* form and the small chalk hill form, including several nice confluent specimens which are as a rule of much less common occurrence in the larger races of this species), *Hylophila prasinana*, *Mitochrista miniata*, *Lithosia mesomella*, *L. sororcula*, *Diacrisia sammio* (*russula*), *Hypocrita jacobææ*, *Porthesia similis*, *Leucoma salicis*, *Triana psi*, *Hypena proboscidalis*, *H. rostralis*, *Metrocampa margaritaria*, *Hyria muricata* (*auroraria*) (a good record), *Ematurga atomaria*, *Bupalus piniaria*, *Semiothisa liturata*, etc., with larvæ of *Hibernia defoliaria*, *Geometra papilionaria*, *Himera pennaria*, *Drepana falcataria*, *D. lacertinaria*, *Lophopteryx camelina*, *Notodonta ziczac*, *N. dromedarius*, *Asphalia flavicornis*, etc.

The Micro-lepidoptera were poorly represented in the captures, and Mr. Sich reported that nothing notable was taken.

A notable Coleopteron was taken by Mr. Carr and subsequently identified by Mr. West as *Athous rhombeus*.

An enjoyable and well-earned tea at Messrs. Bullock's in Ascot village terminated the day's outing just as the expected shower of rain arrived.

JULY 8th, 1915.

Mr. G. B. Pearson, of Russell Square, was elected a member.

Mr. Stanley Edwards exhibited series of *Malacosoma neustria*, *M. castrensis*, and *Cosmotriche potatoria*, and pointed out the variation shewn.

Mr. Robert Adkin's contribution to the exhibit was confined to *Cosmotriche potatoria*, of which species he showed long series, in which were included specimens from Scotland, Ireland, and many parts of England. The chief type of variation was the tendency in some of the females for their colour to approach that of the normal male, while in some of the males there was a tendency to approach the female coloration.

Mr. Leeds exhibited the same three species, and pointed out

the extremes of variation in *M. neustria*, the very dark *C. potatoria* males from Norfolk, and also the very richly coloured females from the same district.

Mr. Sperring showed a very beautifully variegated and dark suffused female of *C. potatoria*.

Mr. Brooks exhibited a light yellow male and a dark female with male coloration of *C. potatoria* from Wicken. He also showed a series of *M. neustria*, including very red forms, forms with only mere traces of the transverse band, forms with the band nearly divided, extremely dark and light forms, and an aberration in which the band was very clearly white-edged, a male.

Mr. A. E. Gibbs exhibited specimens of *C. potatoria*, including a female in which the zigzag markings were obsolescent, a male of uniform pale putty colour and destitute of markings, a male with a minimum of markings and of a reddish-ochreous suffusion on forewings, extremely dark specimens from Cambridge, dark variegated females from Sussex, and several examples in which the basal pale blotches are extremely emphasised in area.

Mr. B. Adkin then read the following notes on the three species exhibited by the members:—

“To-night I am exhibiting specimens of *Malacosoma castrensis*, *M. neustria*, and *Cosmotriche potatoria*, for the purpose of completing my exhibition and remarks upon those *Lachneides* which vary in ground colour from pale yellow to dark brown.

“It is unnecessary for me to give all the forms and names which are to be found in Tutt. I will state very shortly the main features of variation.

“*Malacosoma castrensis*.—The sexes are dissimilar, their variation is on different lines, but the most extreme forms, unicolorous yellow-ochreous on the one hand and unicolorous red-brown on the other, occur in both sexes. Between these there are many shades of colour in both sexes, and a great variety of markings. The typical male has pale yellow ochreous forewings with brown lines and coppery coloured hindwings. The typical female is fawn colour with two transverse yellow lines on forewings. The specimens shown, though far from what I should wish, appear to give a good idea of the range of variation.

“*Malacosoma neustria*.—In both sexes the ground colour varies from pale yellow ochreous, or buff, to deep rust-red or red-brown. The markings vary considerably, either two distinct transverse lines on forewings, or three united, or broken, or forming a band, or absent. The typical form is yellow or buff, with two distinct trans-

verse lines to forewing. The females are seldom yellow and more often banded. The specimens exhibited show much variation.

"*Cosmotriche potatoria*.—In this species, as in those above referred to, the ground colour of both sexes varies from white ochreous to brown. The typical male is reddish-brown with intermingled yellowish shades. The typical female is yellow. The literary type would appear to be the yellow form in both sexes. In my experience the yellow form of the male and the brown form of the female are distinctly uncommon. The yellow male appears to be a form found only in the Fen districts, but the brown female may occur anywhere.

"The markings of the forewing consist of a curved line near the base of the wing, which line is sometimes abbreviated and occasionally absent; a slanting line from near the tip of the forewing to the centre of the inner margin, which is seldom absent, but varies in position and straightness; and a serrated second line outside the last, which is sometimes absent, and varies in intensity. The last two lines are often shaded, and perhaps may occasionally join up to form a complete band, though no specimens in my collection do so. I have purposely selected the more strongly marked females for exhibition, the majority of my females are more ordinary, but there are many districts where heavily marked females and unicolorous dark brown males are very common.

"SUMMARY.—On reviewing the five species of *Lachneides* which I have exhibited, it appears to me that they show great variation of ground colour in every case. With the exception of *L. quercus*, where yellow forms do not appear to occur in the males (the nearest I have seen was exhibited by one of our members), both sexes would appear to vary from pale yellow or buff to dark brown. I do not call to mind any other group of the Macro-lepidoptera where a similar variation occurs.

"Yellow forms of brown insects do not appear to be generally common. There are many British Rhopalocera that are brown in ground colour, but it is very unusual for the brown to be replaced by yellow. It is occasionally found among the *Argynnidae*, e.g., *A. euphrosyne*, the *Vanessidae*, e.g., *Polygonia c-album*, the *Satyridae*, e.g., *Epinephele tithonus*, *E. jurtina* (*janira*), *Caenonympha pamphilus*, etc., and in *Ruralis betulae* and *Rumicia phlaeas*, etc. In the Heterocera, the tendency is seen in *Cochlidion* (*Heterogenea*) *arellana* (*limacodes*).

"The more usual change is I think from red to yellow. Among the *Arctiidae* the hindwings of *Arctia villica* and *Parasemia plantaginis* are normally yellow though the latter at times inclines to red,

Callimorpha quadripunctaria (hera), normally red, often has yellow and intermediate forms, *Arctia caia*, normally red in ground colour of hindwing is not rarely yellow, and yellow hindwings in *Callimorpha dominula*, though rare in nature, have come to be exceedingly abundant by means of artificial breeding. The same remark would appear to apply to the Anthrocerides (*Zygæna*).

"No doubt there are reasons for these changes in ground colour. I have not attempted to research, but I feel sure, if a full knowledge of it is not already available, that it would be an interesting field for study."

Mr. Newman stated that he had found it almost impossible to hibernate the larvæ of *C. potatoria*, and hence one was not able to ascertain whether any Mendelian characteristics are shown in the striking variation.

Mr. B. S. Williams exhibited a bred series of *Bupalus piniaria* from Leith Hill, including a male of a very pronounced yellow colour, and a female, which had its colour areas as in the male, but of two shades of putty colour.

Mr. W. West (Ashtead) exhibited specimens of *Triena psi* and *T. tridens*, and asked what were the definite distinction in markings between the two species. The general opinion was that although two series side by side were sufficiently different it was practically impossible to express that difference in words which would suffice in all cases. Of course the larvæ of the species were different in colour and form.

JULY 22nd, 1915.

MR. A. E. GIBBS, F.L.S., F.E.S., *Vice-president*, in the chair.

Dr. Chapman exhibited the first specimen of *Lattorina pyrenaica* that has been bred, the early stages having up to the present been unknown; also several captured specimens, to give members unacquainted with it some idea of the species. Also specimens of *Lattorina orbitulus* var. *oberthuri*, a form found also in Switzerland, but more characteristic of the Pyrenees, *L. orbitulus* and *L. pyrenaica* are very closely allied but distinct.

Also specimens of *Agriades escheri* var. *rondoui*, bred from eggs obtained at Gavarnie, though these are var. *rondoui*, i.e., the Pyrenean form, they are not ab. *rondoui*, the form to which that name was first applied. These have smaller and less bold spots than the Alpine form, finest perhaps in the Tarentaise, but less so

than the ab. *rondoni*. The males are, however, nice varieties with discal spots and marginal chevrons.

Also living specimens of *Aphidius ervi*, Halliday, from the Aphis of *Ononis arvensis*. It would appear that each species of *Aphis* has an *Aphidius* more or less attached to it only—forming an interesting field of observation to anyone tired of the more beaten track.

Mr. B. S. Curwen exhibited some first brood females of *Polyommatus icarus* from Pigott's Hole, Ranmore Common, all of which were much suffused with blue scaling. Two specimens were of the underside aberration *melanotoxa* (*arcuata*).

Dr. Chapinan called attention to the fact that a large proportion of the females of *Polyommatus icarus* in Mr. Curwen's exhibit had the conspicuous wedge-shaped submarginal blotch of light colour faithfully reproduced on the upperside.

Mr. A. Sich exhibited coloured drawings, beautifully executed by himself, of the larvæ of the British species of the genus *Acronicta*, and referred to the figures of the larvæ of *Triana* (A.) *psi* and *T. tridens*, with remarks on the various points of wide difference of the two species at this stage contrasted with their extreme similarity in the imaginal stage.

Mr. B. W. Adkin exhibited a large series of *Apatura iris* and made remarks on the species as it occurred in Britain. He stated that he considered this species showed far greater variation than is generally supposed, and but for its rarity, would be a far more variable insect than many of our other species of British butterflies.

Two of the specimens shown approached ab. *iole*, a male had a brown costa, and a female with heavily marked brown costa had much brown suffusion over both fore- and hindwings.

Mr. Gibbs said that *A. iris* formerly occurred in Hertfordshire, and that Stephens in his "Illustrations," recorded its presence near Hertford in July, 1833. It was reported to still linger on in the county, and Dr. A. H. Foster, of Hitchin, had informed him that he had seen a specimen in 1899 or 1900, just outside Hitch Wood. Gamekeepers in some of the large Hertfordshire woods confirmed Dr. Foster's statement, for they said very positively that they occasionally saw a large purple butterfly, settling on dead birds, rats, etc., hanging in their "larders." Mr. Gibbs much hoped to be able to report some day the capture of *iris* in a locality so near to London.

Mr. Turner said that one of the old localities was near East Grinstead, Sussex, but he had sought for it there in vain, and local report said that it had disappeared many years before.

Mr. Adkin said that the species was common at Chattenden in the 80's, but had long since disappeared there.

Mr. Sich said that it occurred in Abbot's Wood in the 70's, but he knew of no recent captures.

Mr. Newman had seen but not captured it in the N. Kent woods, and remarked that these woods were so little worked that possibly it still existed in places.

Several members remarked on its increasing scarcity in the New Forest, where it had been worked persistently for so many years.

Mr. B. W. Adkin said that it was more common across the Welsh border, as it also was in the Northampton woods.

Mr. Gibbs called attention to the re-exhibit at S. Kensington of the material illustrating the results of the investigation on the destruction caused to army biscuits by insects, and said that the new methods adopted as a consequence of the report of that enquiry had been eminently successful, the country being saved thousands of pounds thereby.

Mr. B. W. Adkin said that this year he had found the females of *Agriades thetis* to show a considerable amount of blue scaling and to have the orange marking on the upperside emphasised. Mr. Newman said that this was very usual in hot, sunny years, and noted that the present year had been very sunny for a long period during late spring and early summer.

Mr. Edwards and Mr. Gibbs noted that the 2nd brood of *Celastrina argiolus* was now well out.

Mr. Newman said that he had captured immigrant females of both *Pyrameis cardui* and *P. atalanta* a month or more ago, and found them virgin, whereas specimens he had captured a few days ago paired readily and were now laying their ova.

Mr. Gibbs reported that *P. atalanta* had been observed by Mr. Oldham, of St. Albans, on the top of the high mountains in Carnarvonshire. Also that a larva found there feeding on lichen had produced *Lithosia complanula*. It had fed a little on sallow in confinement.

Mr. Sich said that almost immediately *Euchloë cardamines* was over in Surrey this year he had observed *P. atalanta*.

AUGUST 12th, 1915.

Mr. B. H. Smith exhibited the following species of Lepidoptera from New Zealand :—*Pyrameis gonerilla*, the New Zealand representative of *P. cardui*, *Argyrophenga antiporum*, formerly placed

in the genus *Erebia*, to which it is closely allied, and several species of *Lycanidæ*.

Mr. B. S. Williams exhibited a short series of *Zygæna trifolii* var. *palustris* from Somerset, including confluent forms and an aberration of *Xanthorhœ sociata*, in which the usual dark fascia on the left forewing was reduced to a blotch on the inner margin.

Mr. West, of Ashtead, exhibited ova of the Neuropteron, *Chrysopa perla*, laid solitary each on a long stalk.

Mr. Stanley Edwards exhibited a living specimen of a European Salamander (*Salamandra maculata*), and contributed the following note:—"The salamander exhibited was found in a garden at Blackheath, and an owner was unable to be found for it. It is a native of the Tyrol. It feeds readily on earthworms and has been in my possession since November last. It is very fond of its bath. According to Gadow there are about twenty-five species of salamander known so far."

Mr. Hy. J. Turner exhibited a short series of *Brenthis pales* var. *arsilache*. The series was a small form of the variety, which he had found in an extremely restricted locality in the Engadine, between St. Moritz and Campfer, and which was attracted by the flowers of the Marsh Cinquefoil (*Comarum palustre*), of which he exhibited a dried specimen.

He also showed a series of forms of *Parasemia plantaginis*, which he had casually met with around St. Moritz, Engadine, in 1914, including a normal male and female, a male with increase of yellow ground on the hindwings, two males with the ground colour on both wings of an almost pure white, but with the black area much increased especially on the hindwings, a male with the markings quite ordinary in position and area, but with the ground colour on all wings pure white, and a male with yellow ground colour on all wings and a considerable increase of the black area.

Mr Stanley Edwards read the following Report of the delegates to the Congress of the South-Eastern Union of Scientific Societies at Brighton.

The twentieth annual Congress of the Union was held at Brighton from June 2nd to the 5th, in the Public Library in Church Street, the intended meeting-place, the Pavilion, being occupied by the Indian wounded, but the present building with its various galleries of Art, Anthropological and Zoological specimens, was, I think, more in keeping with a gathering of the kind. Two excursions were arranged for Wednesday afternoon, one a visit to the fine Booth collection of birds, under the guidance of Mr. H. S. Toms,

where tea had been provided for 100 guests through the kindness of Alderman and Mrs. Griffiths; the other, under the guidance of Mr. F. Harrison, a stroll round "Old Brighton," when Dr. Martin gave an account of the "Old Ship Hotel."

I arrived as one of your delegates on the Wednesday evening, my co-delegate, Mr. H. J. Turner, being unable to be present until Saturday. In the evening, the ex-President, Dr. Chalmers Mitchell, F.R.S., occupied the chair, and was supported by the Mayor, Alderman Otter, J.P. The address of the President, Dr. J. S. Haldane, M.A., L.L.D., F.R.S., was given in the Permanent Art Gallery. Unfortunately Dr. Haldane was unable to be present, being detained in London by Government business, and the Chairman called upon the Secretary, Dr. Martin, to read it. The subject was, "The place of Biology in Human knowledge and endeavour," and having referred to the greatest war the world has ever seen, went on to the problem, "What is Life?"

The Chairman expressed thanks to Dr. Martin for the admirable way in which he had read the "Address," and on the proposal of the Mayor, seconded by Dr. Dukinfield Scott, a vote of thanks was passed to Dr. Haldane.

On Thursday morning the Delegates met to hear the Annual Report, the Rev. T. R. R. Stebbing, F.R.S., in the chair. The report showed that 73 societies were affiliated to the Union. The Treasurer, Mr. Adkin, read the balance sheet, which was satisfactory, and it was agreed that, as in 1916 the Union would celebrate its 21st birthday, the Congress be held at Tunbridge Wells, under the Presidency of the Rev. T. R. R. Stebbing, its first President.

Subsequently, Prof. Boulger in the chair, Mr. C. C. Fagg, of Croydon, read a paper on "Natural History Societies and Regional Surveys," in which he advocated maps as being the most comprehensive method, and illustrated it from the Croydon survey.

At twelve o'clock Mr. Hugh Findon, F.L.S., gave a paper illustrated by lantern slides, "The Problem of Fluvatile and Terrestrial Shellfish," Mr. Whitaker, F.R.S., being in the chair.

In the afternoon, one excursion was to visit churches at Sumpting (which is considered unique in England on account of its four-gabled spire), Old Shoreham, Lancing, Broadwater, and West Tarring, under the guidance of Mr. P. M. Johnstone, F.R.I.B.A. It was a delightful drive, although the weather might with advantage have been warmer.

The other excursion was a local geological one, to the Black Rock

for examination of the "Brighton Cliff Formation," conducted by Mr. E. A. Martin, F.G.S.

In the evening the conversazione took place, when the Mayor and Mayoress received the President and some 300 guests; and a few impromptu speeches were made. The various galleries were well filled with objects of interest, amongst which was a very interesting local botanical exhibit. A good musical programme enhanced the evening's proceedings.

Friday morning was devoted to two papers, one on "Brighton's Lost River," by Mr. E. A. Martin, who said, "In the Brighton valley we know that within the memory of many who are still living, the London road from Patcham has been rendered impassable at times owing to the welling up of water from underground sources. As recently as 1876 this Wellsbourne, as it was called, flooded the road into Brighton. The port of Brighthelmstone extended in recent times from about the Old Ship Hotel to West Street." A discussion followed, when Mr. F. Merrifield said he remembered the stream in the London road in the forties. Mr. H. D. Roberts, Director of the Library Institution, mentioned that the traces of the lost river were so near to them as to exist in the basement of the Public Library, where machinery had been installed to pump out the water, which at times percolated through from the old river course.

Mr. A. Bonner then read a paper on "The Study of Place names, with illustrations from the South-East of England." He gave amongst others the evolution of a place name as illustrated by Parkminster, the Carthusian Monastery at Cowfold. The original name of the farm there was Picknowle, the land was bought by a man who built a big house there, and thinking the name not good enough, he changed it to Parknowle. Eventually he sold the property to the Carthusian monks, who changed the name to Parkminster.

At a sectional meeting a paper on "The House Fly Peril" was read by Major G. Hurlstone Hardy.

On Friday afternoon there were two excursions. The first was to Leonardslee, Horsham, the estate of Sir Edmund Loder, Bart., J.P., where some 76 members went by motor charabancs. After a very pleasant drive, we arrived at this "earthly paradise," and thanks were duly given to Councillor Henry Cane for obtaining permission to go over this estate. Sir E. Loder conducted us, pointing out a magnificent display of rhododendrons, azaleas, etc. There were also wallabies, emus, deer, and beavers living free in

the open park. We saw our host's museum, where there were trophies from many lands, as he is a great sportsman. Eventually the party were brought back to the house, where tea had been provided on the lawn by Lady Loder. Professor Boulger proposed, and Mr. Merrifield seconded, a hearty vote of thanks to Sir E. Loder for his kindness. The other field meeting was a local Archæological one, and conducted by Mr. H. S. Toms, to Hollingbury Camp.

On Friday evening, before a crowded audience, Mr. E. J. Bedford gave a most interesting lecture on "Sussex Orchids," illustrated with many lantern slides.

On Saturday morning I attended the Delegates meeting, when Reading was suggested as a suitable place to hold the Congress in 1917.

At 11.30, Professor G. S. Boulger, F.L.S., gave a most interesting historical account of "Kew, some notes on its connection with the History of Botany," with Dr. Scott, F.R.S., in the chair.

In the afternoon Lewes and its churches were visited, and also the castle, the conductor being Mr. J. S. North.

A Botanical meeting was held at Saddlescombe and Poynings, conducted by Mr. H. Edmonds, B.Sc.

So ended the Congress, which if on account of the war, was not so largely attended as some of the previous ones have been, was second to none in interest.

AUGUST 26th, 1915.

Mr. A. E. TONGE, F.E.S., *Vice-president*, in the chair.

Mr. Hugh Main exhibited leaves of the sycamore showing the circular holes made by the larvæ of the sawfly, *Phyllotoma aceris*, when constructing its case for pupation. In two of the leaves the discs were not yet detached. He also showed leaves of the alder in which another species of *Phyllotoma* fed. In this case he pointed out that the species did not detach a disc containing its pupal chamber, but the whole leaf fell.

Mr. Stanley Edwards exhibited a number of butterflies from South America illustrative of the genera *Cybdelis*, *Cyclogramma*, *Catonephele* (*Epicalia*) and *Myscelia*, most of the species showing extreme sexual dimorphism. Included were *Cybdelis mnasylus*, *Cyclogramma pandana*, *Catonephele numilia*, *C. acontius*, *Epicalia chromis*, *E. nyctimus*, *E. salambria* and *Myscelia orsis*.

Mr. Newman exhibited a "blue" captured by him in Kent on July 4th, which he considered from its colour and markings to be a hybrid between *Agriades coridon* and *A. adonis*. Dr. Chapman said that it appeared to resemble a specimen he had obtained from the "Tutt" collection, and which on examination microscopically he found to be the hybrid known as *polonus*. Mr. Newman also exhibited two underside aberrations of *A. coridon*, in one of which the ground colour was pearly white with large spots, the other was a form ab. *obsoleta*.

Mr. Bunnett exhibited the ova of *Chrysopa flava*. These were attached to long stalks, but were assembled in a bunch, not solitary as in the case of the *Chrysopa perla* exhibited recently by Mr. West.

Mr. C. B. Williams exhibited a box containing the Lepidoptera he had met with in the Italian Val Formazza, leading up from Domodossola to the Tosa Falls (912ft. to 5400ft. above sea level). (See "Ent. Record," vol. xxviii., p. 4.)

Mr. Ashdown exhibited two aberrations of *Coccinella bipunctata*; one having irregular blotches on each elytron and the other having a transverse bar and marginal spots. They were from Surrey.

Mr. West exhibited a rare species of Coleoptera, *Seymnius arcuatus*, presented to the Society by the Rev. J. T. Perry, formerly a member, from Henley-on-Thames. It was a rare species. Mr. C. B. Williams suggested that it was the larva of this species he believed to feed on the *Aleyrodes* (*Aleurodes*) sp. which was found on ivy.

Mr. Sperring exhibited some extremely dark aberrations of *Boarmia gemmaria* (*rhomboidaria*) which he had bred from ova. The larvæ were hibernated in a sleeve on privet. The parent was taken at Darenth, Kent.

Mr. Tonge exhibited examples of *Zygaena filipendula*, the confluent form, from Reigate, and asked if this aberration had been met with elsewhere. Several members, in spite of breeding large numbers, had not obtained this form.

Mr. B. S. Williams, on behalf of Mr. E. Wanhill, exhibited a curious example of *Gonepteryx rhamni*, bred from a North Kent larva. It was predominantly a male, in which the forewings were streaked with female coloration. He also showed melanic examples of *Hibernia defoliaria* from Epping Forest, and two very pale almost albinistic forms of the same species.

Mr. Bowman exhibited a long series of *Hibernia defoliaria* taken in Epping Forest in 1914. Included were a dozen decided melanic specimens, nine of which had smoky hindwings, while the other

three were somewhat paler. A few specimens were very light in ground colour, and a few others fairly dark. The bulk of the series were mostly dark banded with a light ground. Two of the melanic specimens had a deep yellow marginal area, all the rest of the melanic specimens had dark fringes on the outer margin. One of the examples had an irregularly widened submarginal band which angled out nearly to the margin. A considerable proportion of the specimens had a portion of the light central area white, while one example had almost the whole of this area white. In one specimen the sub-basal transverse band was extended to the base. Several examples had the transverse light band of two distinct shades of colour longitudinally. There were only three of the form with the almost uniform orange mottling. There were several specimens in which the two dark transverse bands approach one another very closely near the inner margin. Mr. Bowman said that during the nine previous years he had only obtained two melanic forms in the same locality, while in 1914 he alone had taken the twelve examples exhibited, while other entomologists also had obtained the form.

SEPTEMBER 9th, 1915.

Mr. A. E. GIBBS, F.L.S., *Vice-president*, in the chair.

Mr. Sano exhibited living larvæ, pupæ, and imagines of the Longicorn Coleopteron, *Rhagium inquisitor*.

Mr. Leeds exhibited a number of underside aberrations of *Agriades coridon* mainly from Royston, Herts, including some with very dark ground colour, asymmetrical, and nearly obsolete forms. He also showed *A. coridon* ab. *syngrapha* with very dark borders, ab. *semisyngrapha*, and numerous female *Polyommatus icarus* with much blue suffusion. It was the observation of several members who had visited Royston, Herts, this season, that the females of *coridon* were not in the great majority over the males as they had been reported to be in previous years.

Mr. H. Moore exhibited imagines of the *pylades* group of the genus *Papilio* and read the following note:—

"The *pylades* group is composed of but a few species having fairly well-defined limits of distribution south of the Sahara. *P. pylades* is found from West-North Tropical Africa to the White Nile, and southwards to the most northerly part of the Congo State. *P. angolanus* (Goeze) from the Congo southwards to the coast of Natal. *P. morania* (Angus) from the south-east coast

of Natal to Delagoa Bay. *P. endochus* (Bsd.) is confined to Madagascar."

Mr. West (Greenwich) exhibited the rare Coleopteron, *Athous rhombeus*, taken at the Field Meeting at Ascot on July 3rd by Mr. Carr.

Mr. B. S. Williams exhibited an aberration of *Eupithecia subnotata*, in which the usual mottled markings were for the most part absent, the submarginal area of the forewings being marked by a series of quadrate light spots. He also reported a conflict between a robin and a *Catocala nupta*; the latter finally escaping.

Mr. R. Adkin reported having seen *Colias edusa* near Eastbourne, and Mr. Leeds reported var. *helice* from Hertfordshire.

SEPTEMBER 11th, 1915.

FIELD MEETING IN THE CLAYGATE AND OXSHOTT WOODS.

Leader.—HY. J. TURNER, F.E.S.

It was thought that a larva-hunting field meeting might be held in this generally good locality with some profit to those taking part. Apparently this was not so, as only one record was sent in, and personally, but few items were noted, while the nine members who succeeded in finally gaining the tea-house had met with but little luck. The number nine is somewhat misleading, for taking into account those members who got lost in the maze of woods, those who attended the meeting and did not go to the tea, those who did not know that there was a meeting and were present a part of the time, together with those who sent in their names and cried off, we should have scored at least twenty.

Mr. Ashdown records finding no less than nine species of *Coccinellidæ* by beating the fir trees, while by sweeping he got nothing but a few Hemiptera, the only capture of note in this order being *Pilophorus cinnamopterus*.

[Subsequently to the reading of the Report the following species were reported as being taken in the larval stage:—*Eupithecia coronata*, *E. lariciata*, *E. albipunctata*, *E. centaureata*, *E. absynthiata*, *E. assimilata*, *E. vulgata*, *E. succenturiata*, *E. exigua*, *Arctia caja*, *Hemithea strigata*, *Cabera pusaria*, *Euchæca oblitterata*, etc.].

SEPTEMBER 23rd, 1915.

Mr. A. E. GIBBS, F.L.S., F.E.S., *Vice-president*, in the chair.

An evening for the Exhibition of Lantern-slides.

Mr. Rowan exhibited a long series of slides illustrating the habits of birds, many of them taken under difficult circumstances, and only after great patience. The series included sets of the Common Owl, Common Tern, Little Tern, Wild Duck, Bullfinch, Robin, Song Thrush, Moorhen, Dotteril, Lapwing and Turkey.

Mr. Tonge exhibited slides of the resting attitudes of the imagines of *Urapteryx sambucaria*, *Eremobia ochroleuca* on a flowerhead, *Dicranura vinula* on a tree-trunk, *Pyrameis cardui* on a flower, and ova of *Cidaria corylata*.

Mr. Colthrup exhibited the attitudes of the living larvæ of *Zygana hippocrepidis*, *Angerona prunaria*, *Dicranura vinula*, and the resting positions of *Brenthis euphrosyne*, *Epinephele tithonus*, *E. jurtina* ♀, *Gonepteryx rhamni*, *Rumicia phlaas*, *Melanargia galathea*, with a group of *Polyommatus icarus* settled for the night.

Mr. Hugh Main exhibited a series of coloured slides of botanical and entomological subjects, including slides of Orchids with *Cypripedium*, Alpine Plants, Narcissus with the narcissus-fly, a Dragon-fly, Water-plants, a sunset scene in Epping Forest, etc.

Mr. Tonge exhibited a long series of *Boarmia repandata* and var. *conversaria*, reared by him from ova laid by a female var. *conversaria* taken at Holt, Norfolk, on June 20th, 1914. The result was a most abnormal one being ♀s *repandata* form=29, ♂s *repandata* form=1; ♀s *conversaria* form=39, ♂s *conversaria* form=0. Mr. Tonge also exhibited a series of *Numeria pulveraria* reared from ova laid by a female taken at Abbot's Wood, in May, 1913, in which the variation was practically nil. The result showed of ♂s=24, ♀s=27.

Mr. B. S. Williams exhibited a specimen of *Crocallis elingvaria*, captured at Finchley in August, in which the yellow ground colour was heavily dotted with dark brown, while the central band was much darker with a sharp pale line separating it from the ground colour.

Mr. West, of Ashted, exhibited a specimen of the Fairy Shrimp *Branchippus diaphanus*, a freshwater Crustacean, taken in a deep cart rut where water had collected, during the Society's Field meeting at Claygate, on September 11th.

Mr. Morford exhibited the case of the Psychid, *Pachythelia villosella* from the New Forest.

Mr. Buckstone exhibited a small bred series of *Lithosia deplana* from Mickleham. One ♀ specimen had all four wings dark smoky colour, the costal margins and fringes being rich yellow.

Mr. Priske exhibited the large Dipterous galls in the stems of thistles caused by *Urophora cardui*.

Mr. Leeds exhibited a number of specimens of "blues" that he had taken this season, mostly in Herts; they included aberrations of *Agriades coridon* from Royston, males with perfect rings on the hind margins of the hindwings, forms of the female with khaki streaks, underside aberrations, and a specimen of *Epinephele jurtina* with additional spots on both upper and underside forewings. He also showed an example of *A. coridon* ab. *semisyngrapha* from Kent.

OCTOBER 14th, 1915.

Mr. A. E. TONGE, F.E.S., *Vice-president*, in the chair.

M. Sano, a Belgian entomologist, exhibited a large number of lantern-slides illustrative of the life-history of *Geotrupes stercorarius*, and contributed a series of notes on the exhibits. He also exhibited lantern-slides which had been made by Mr. Main who had collaborated with him. (See page 25.)

Mr. Priske exhibited the seven British species of the genus *Geotrupes*, and called attention to a coppery coloured aberration of *G. stercorarius*.

Mr. Main exhibited some cages which he had in use to watch the method of cell-making by these beetles, and contributed the following "Note to M. Constant Sano's paper on the Dor Beetle."

"The Society is indebted to M. Sano for the interesting paper which he has allowed us to publish.

"I wish to record my thanks to him for introducing me to such an interesting insect, and for his kindness in going to much trouble to secure for me a number of specimens from which I was able to make the accompanying photographs.

"During the War our Society offered its hospitality to members of the Natural History Societies of our Allies, and we were able to welcome M. Constant Sano, of Antwerp, as a frequent visitor and exhibitor.

"M. Sano's observations correct a number of errors commonly repeated in our books on Coleoptera. Nearly every writer I have referred to on the subject of the insect under consideration introduces or copies numerous errors.

"One well-known popular author, in addition to errors in his few remarks on its life-history, says the Dor Beetle is "the Shard-borne beetle of Gray's well-known Elegy." What the poet really says is :—

" . . . the Beetle wheels his droning flight."

"It is Shakespeare who says :—

"Ere to black Hecate's summons,
The shard-born beetle with his drowsy hums
Hath rung night's yawning peal."

"Both references are generally considered to refer to the insect in question."

Mr. L. W. Newman exhibited a very long and varied series of *Aplecta nebulosa* and its varieties ab. *robsoni*, ab. *thompsoni*, and intermediate forms. A pairing was obtained in 1914 from male and female, both of the *robsoni* form; about 400 ova were laid, of which over 350 were successfully reared to the imago, and the percentages are as follows :—

Robsoni (including intermediate) 50 %, typical specimens 26 %, *thompsoni* 24 %.

He also showed a series of *Boarmia repandata* var. *conversaria*, from a pairing obtained between a typical light Hunts ♀ crossed with *conversaria* ♂. A large percentage of the brood were reared, and that every specimen produced was var. *conversaria*, and every one a ♀, is a most remarkable result.

Mr. Newman recorded the following interesting breeding experience that had occurred to him with *Abraxas grossulariata* of the race containing ab. *varleyata*.

"In 1908 I thought I had lost this strain, but I continued to inbreed from typical specimens from the same race that in 1907 produced the var., and this year I bred 10 % *varleyata*, so that the var. has remained dormant in the strain five years, during which period nothing but typical forms were produced."

Mr. Kaye, in reference to Mr. Newman's exhibit, quoted the opinion of the late J. W. Tutt that not all melanic forms are new, but were ancient forms which for years had ceased to be dominant, but which were liable to reappear in favourable circumstances.

Mr. P. A. Buxton communicated the following record sent from the Dardanelles by his brother, Mr. D. A. J. Buxton.

"I saw a big hawk moth one evening lately, and was going to pursue it with my helmet, when a young butcher-bird swooped down and flew off with it to a tree across a field. I followed, hoping to find the wings at least, and there he was pecking away and enjoying himself. As he shewed no intention of dropping it, but rather of flying off elsewhere, I threw a stone at him and he disappeared, but he took his dinner with him. It was a spurge or striped hawk, or similar species."

Mr. Main, in referring to Mr. Buxton's communication, said

that he had allowed an *Amorpha populi* to escape in the twilight one evening, when it was immediately chased by a starling from the roof and caught on the wing. Mr. Buxton said that some time ago Dr. Cockayne had set free a very large number of this species and had thereby attracted all the sparrows of the neighbourhood. It must be noted that *A. populi* is not a strong flier.

Mr. Morford exhibited a number of specimens of *Setina irrorella*, *S. aurita*, and its var. *ramosa*, sent to him by Professor Morel from N. Italy.

Mr. Ashby exhibited a long series of the rare Buprestid beetle, *Agrilus viridis*, which he had met with in some numbers in the New Forest. He pointed out the sexual dimorphism in colour, the ♂ being green on the under surface of the abdomen and the ♀ coppery. He said that he found it of no use to beat for the species, the females were taken flying low.

Mr. Robert Adkin exhibited specimens of *Zygena filipendulæ*, reared in July last from pupæ collected in a field at the top of the Downs near Otford, Kent, on the occasion of the Society's field meeting. One of the specimens had only five spots on the upper-side of the forewings, the usual outer sixth spot being absent, but on the underside the position of the missing sixth spot was indicated by a dull red blotch. The black margins of the hindwings were somewhat broader than is usual in *Z. filipendulæ*, in this respect resembling *Z. trifolii*, but the fact of the pupæ being found high up on a grass stem, and the presence of the sixth red blotch on the underside showed that it could not be the latter species.

Mr. Newman recorded that a correspondent of his near Brighton had bred some thousands of *Z. filipendulæ*, and amongst them were between twenty and thirty of this five-spotted form, while a large number had the sixth spot only very faintly marked.

OCTOBER 28th, 1915.

Mr. R. ADKIN, F.E.S., in the chair.

Mr. W. J. Lucas read a paper on "British Cockroaches," and exhibited a large number of lantern slides illustrative of his subject. (See page 29.)

In the subsequent remarks Mr. Edwards noted that he had observed at Blackheath that *Blattella germanica* was gradually turning out the formerly abundant species *Blatta orientalis*, and Mr. P.

A. Buxton said that at Cambridge it was *Periplaneta australasiae* that was supplanting *Blattella germanica*.

Mr. P. A. Buxton exhibited a box of butterflies taken by him some time ago during a tour in Algeria, and called attention to the fact that the species were practically all either European species or forms closely allied to them, *Teracolus nonni* being the only species purely African in its affinities. There was included a nice series of the beautiful *Euchloë charltonia*, and also specimens of the rare *Anthocharis falloui*.

Mr. Alfred Sich exhibited two mines of the rare Tineid, *Nepticula tilia*, Frey, from the Torrent Walk, Dolgelly, Merionethshire, and stated that many empty mines were noted in the Fairy Glen, Bettws-y-Coed, Carnarvonshire. The larvæ mine the leaves of the lime, and seem to prefer trees growing in a shady situation near water.

Mr. Priske exhibited a rare slug, *Limax cinereo-niger*, which he had found in Epping Forest. It was, he believed, the first record of the species in Essex. Mr. Sich remarked that the species was by no means common, and that when full grown it was much larger, in fact it was one of the largest of our indigenous species.

Mr. Moore exhibited a living male specimen of the stick-insect (*Linchodes*, sp.) which has been so extensively bred in England during the last few years.

Mr. Brooks exhibited a series of *Plebeius ægon* from Kendal, including several examples of the beautiful blue female form known as ab. *masseyi*, Tutt. He also showed a specimen of *Charæas graminis*, in which the usual wedge-shaped submarginal dark markings on the forewings were nearly obsolete.

Mr. B. S. Williams exhibited a short series of *Mamestra* (*Hadena*) *trifolii* (*chenopodii*), including a very pale ochreous grey form bred from Finchley, a dark greyish fuscous form captured, and a reddish ochreous specimen taken at Wicken. The last form he stated was very uncommon.

Mr. Bowman exhibited a specimen of *Saturnia carpini* which was very dark in general coloration with exceptionally red lower wings. He also exhibited an abnormally sized and shaped cocoon of the same species, which possibly might prove to have been made by two larvæ.

NOVEMBER 11th, 1915.

Mr. A. E. GIBBS, F.L.S., F.E.S., Vice-president, in the chair.

Mr. R. Adkin exhibited a short series of *Eupithecia castigata*

reared in May last from ova obtained from a moth taken on the occasion of the Society's field meeting at Beaconsfield on June 20th, 1914. The larvæ were fed almost entirely on the flowers of an Alpine campanula (*Campanula pusilla*), a species often grown in rock-gardens, apparently preferring it to any of the numerous other wild or garden flowers with which they are usually associated.

Mr. A. Sich exhibited the following four species of British slugs, *Agriolimax agrestis*, *Milax sowerbii*, *Arion hortensis*, and *Testacella scutulum*, and a series of coloured drawings of all the British species of land slugs, executed by himself. He then read a paper entitled "Limacology." (See p. 41.)

In the ensuing discussion Mr. Priske stated that he had frequently seen *Testacella* disgorge the worm it had just previously swallowed. Mr. Morford said that in Cornwall slugs were considered as a cure for whooping-cough, and Mr. Edwards noted that in some parts of the country they were strongly recommended to those suffering from consumption. Mr. Adkin referred to the impossibility of satisfactorily preserving slugs for any length of time. Sooner or later the body shrinks and the colour goes. A weak solution of formalin, as a preservative, is only effective for a few months.

NOVEMBER 25th, 1915.

ANNUAL EXHIBITION OF VARIETIES.

Mr. A. E. GIBBS, F.L.S., F.E.S., *Vice-president*, in the chair.

Mr. A. E. Tonge exhibited:—

(1) A specimen of *Pyrameis atalanta* with the band of the hindwing orange in colour instead of red. It was taken at Deal.

(2) A series of *Polyommatus icarus*, males and females, selected from the year's captures, to show extreme blueness in female upperside and range of underside aberration in both sexes, taken at Deal and Reigate.

(3) *Agriades thetis* (*bellargus*), females of very blue coloration of the first brood from Reigate.

(4) Selected specimens of *Agriades coridon*, of both sexes, from Deal, Ashford, and Reigate, showing considerable aberration. One ♂ has a leaden-coloured upperside, with underside clouded and indistinct, suggested as due to moisture.

(5) A short series of confluent forms of *Zygana filipendula*, in which the central and basal spots were united into an irregular blotch.

Mr. H. A. Leeds series of Lycænid aberrations as follows:—

Agriades coridon.

- ♂ . Very wide blackish border. (Upperside, Herts.), ab. *suffusa*.
- ♂ . Intermediate between ab. *fowleri* and type. (Upperside, Herts.)
- ♂ . Approaching ab. *fowleri*. (Upperside, Herts.)
- ♂ . Marginal black spots of hindwings completely ringed with white and black circles—margin of forewings also well marked. (Upperside, Kent.)
- ♀ . Ab. *semisyngrapha* with khaki streaks on right forewing. (Upperside, Herts.)
- ♂ . Central spots elongated into streaks on forewings. (Underside, Herts.)
- ♂ . Forewings:—Left side, 4 interrupted spots, approaching ab. *arcua*; right side, var. *melanotoxa*, but with two black lines instead of one. (Underside, Herts.)
- ♂ . Pale spots, small and few in number. (Underside, Herts.)
- ♀ . Spots large on all wings, and forewings whitish suffused. (Underside, Herts.)
- ♀ . Heavy coalescence of many black spots on forewings. (Underside, Herts.)
- ♀ . Some spots coalescent on forewings. (Underside, Herts.)
- ♀ . Many spots lanceolated or comma-shaped on forewings. (Underside, Herts.)
- ♀ . Few spots elongated or united on forewings. (Underside, Herts.)
- ♀ . Underside whitish on forewings, with additional dots and fine streaks of black, nervures well-defined. Upperside, ab. *semisyngrapha*. (Herts.)
- ♀ . Sparsely spotted vars. (Underside, Herts.)

Polyommatus icarus.

- ♀ . Mauve-blue ground, discal spots surrounded with whitish, within outer marginal border are large wedge-shaped whitish markings, on all wings. The forewings have only two faint ocellated spots on border, hindwings orange markings very slight, but black dots are distinct. (Upperside, Herts.)
- ♀ . Dark metallic blue ground. (Upperside, Herts.)
- ♀ . Metallic blue ground. (Upperside, Herts.)
- ♀ . ab. *carulea*. (Upperside, Herts.)
- ♂ . Sparsely spotted vars. (Underside, Herts.)
- ♀ . Very slightly spotted. (Underside, Herts.)

- ♀ . Spots elongated. (Underside, Herts.)
 ♀ . Black spots and their white surroundings elongated on upper wings; also additional dots. (Underside, Herts.)

Cænonympha pamphilus.

- ♀ . Large, bright tawny with ochreous blotches. (Upperside, Herts.)
 ♂ . ab. *lyllus*. (Upperside, Herts.)
 ♂ . ab. *pallida*. (Underside, Kent.)
 ♂ . Ochreous ground, borders approaching ab. *lyllus*, apical spots dark. (Upperside, Herts.)
 ♀ . Approaching ab. *pallida*. (Upperside, Kent.)
 ♀ . Very large and dark apical spots. (Upperside, Hunts.)

Agriades thetis (bellargus).

- ♂ . Smoky suffused. (Underside, Kent.)
 ♂ . Forewings with few extra spots, some coalescing. (Underside, Kent.)

Chattendenia (Thecla) w-album.

- ♂ . W almost absent. (Underside, Hunts.)

Epinephele jurtina (ianira).

- ♀ . Two extra spots beneath ocelli on forewings. (Underside, Herts.)

Dr. E. A. Cockayne exhibited a series of *Dysstroma concinnata* taken by Mr. R. Y. Horn, at Terbert, on the mainland of Argyleshire.

To compare with these were series of *D. concinnata*, Arran Isle, and melanic aberration, the two Irish *concinnata* taken by Captain Gwatkin-Williams, R.N., on Achil Island, *D. citrata (immanata)* ab. *pythonissata* from the Shetlands, a varied series from E. Aberdeenshire, *D. truncata*, English and Scottish, and a form from Sutherland showing great resemblance to *concinnata*. The point of the exhibit is that *concinnata* has not been taken on the mainland of Scotland since Curtis took it in August, 1835. Mr. Horne's series was taken at rest on rocks amongst heather, and no typical *truncata* were present. The specimens were taken in July, 1915.

Mr. Percy Bright exhibited very fine series of striking aberrations, of which the following are the principal forms;—

Rumicia phlaeas.—(1) An underside right hindwing with markings of upperwing reproduced. (2) An underside having very dark hindwings with striated markings in lighter colour.

Arctia caja.—(1) A graduated series of aberrations from a magnificent specimen with forewings wholly cream coloured, except

a central spot, to a melanic example with forewings completely brownish-black without lighter colour. (2) A striking asymmetrical form in which the right fore- and hindwings were very melanic. (3) An extraordinary form in which the colours on the forewings were reversed.

Agriades coridon.—A curious silvery-white specimen found in an old British collection without data, comparable with a Spanish form.

Pieris brassicae.—(1) An unique aberration of the ♂ of a pinkish-drab colour, bred by Mr. Percy Richards from wild larvæ this year. (2) A fine ♀ form in which the markings on the forewings were connected into a more or less perfect band.

Euchloë cardamines.—(1) An example with pale orange apex of forewings. (2) One with clear yellow apex. (3) The scarce aberration without central spots. (4) Six gynandromorphic specimens, including one with left side ♂, right side ♀. (5) A very dark underside with much less white than usual on the hindwings.

Leptosia sinapis.—(1) A dark cream coloured example. (2) Three without dark tips to the forewings. (3) An underside of dark brown. (4) An underside of deep green.

Gonepteryx rhamni.—(1) Four specimens with scarlet markings. (2) A very striking form with bright scarlet tip to the left forewing. (3) Three gynandromorphic specimens. (4) An example with a very dark underside.

Chrysophanus dispar.—A series of 14 examples, including one with bleached right forewing.

Mr. Bright also exhibited for Mr. Tatchell of Bournemouth:—

1. A ♂ *Saturnia carпинi* of very dark general coloration, bred in 1914.

2. A bred ♀ of *Eriogaster lanestris* with the central white spots on forewings replaced by dark brown.

3. An extremely finely-developed ab. *fowleri* of *Agriades coridon*, taken in the Isle of Purbeck in 1914.

Mr. L. W. Newman exhibited:—

1. Long and varied series of *Pieris napi* from Ireland, showing extreme variations from spotless to very large spotted and approaching banded males, and females very heavily marked and yellowish.

2. Long and varied series of *Aplecta nebulosa* bred from ova obtained from a pairing of the var. *robsoni*, the brood producing 50 per cent. *robsoni*, 26 per cent. type, and 24 per cent. *thompsoni*.

3. Series of *Zygana filipendula* bred from ova, the larvæ being two years in feeding up. Female parent being the orange variety

and male parent yellow variety, the result being all pink, orange, and yellow specimens, no red being bred.

4. Specimens of *Abraxas grossulariata* ab. *varleyata* bred from a strain which had produced types only for the past five years. In the previous years to this *varleyata* were bred from the strain each year.

5. Series of *Ennomos quercinaria* bred from a Regent's Park female, including banded and unicolorous chocolate forms.

Mr. Hy. J. Turner exhibited—

1. A series of aberrations of *Agriales coridon* from Royston, Herts, including a number of ♀ ab. *semisyngrapha*, incomplete *semisyngrapha*, a female irregularly striated with blue on the forewings, a number of specimens with the discoidal spots on all wings conspicuously marked with white, and one or two aberrations in the underside spotting.

2. A series of ten males and nine females of *Parnassius delius* taken in the Engadine at 8000ft. on one afternoon in August, 1914, showing much minor aberration.

Mrs. R. E. Page exhibited, on behalf of Mr. P. A. H. Muschamp, of Stäfa, Switzerland, a long series of more or less gynandromorphous males resulting from one brood of crossing of *Lymantria dispar* and its. var. *japonica*. The breeding of these insects is interesting as a proof of the truth of Dr. Schweitzer's theory that one out of every four batches of ova from this particular degree of mongrelisation, should give all gynandromorphous males. Further particulars will shortly be available in the "Entomologist's Record."

Mr. A. Mera exhibited a variable series of *Lampropteryx* (*Cidaria*) *suffumata* and other allied species, and remarked that the principal feature consisted of three specimens of *suffumata* taken in East Devon and given to him by the Rev. J. W. Metcalfe, who told him that where the insects were taken there is none of the usual food-plant of *suffumata*, viz., the common hedge bedstraw. The three specimens certainly stand out very distinctly from the other *suffumata* in the drawer, both in shape and size of wing, and seem in markings and size as near to *Eustroma* (*Cidaria*) *silacea* as to *suffumata*. One of the three is a second brood specimen and was not taken in the same wood as the other two. This was considered by Mr. Metcalfe to be a rare occurrence of a second brood of *suffumata*, whereas it is well known that *E. silacea* is always double-brooded. As to the genitalia, Mr. Metcalfe, who is an expert, in such investigations, can find no difference between these odd specimens and *suffumata*.

Mr. B. S. Curwen exhibited a drawer of many aberrations of *Polyommatus icarus*, all from the British Isles, and including the named forms ab. *cærulescens*, ab. *cærulea*, ab. *angulata*, ab. *striata*, ab. *melanotoxa* (*arcuata*), ab. *iphis*, ab. *icarinus* and ab. *semi-persica*.

Mr. R. T. Bowman exhibited a bred series of *Geometra vernaria*, including an example in which the transverse lines on the disc of the forewings converge and nearly meet in the centre, and another specimen in which these lines converge, and on the right forewing are united by a considerable suffusion of white. The specimens were from Kent larvæ. He also exhibited some melanic forms of *Hydriomena impluviata* bred from larvæ collected at Oxshott.

The Rev. G. Wheeler exhibited three small boxes of British Lycænids, taken in July and early August this year:—

1. *Polyommatus icarus*, Rott., from the Durham coast, remarkable for their large size and the brilliant tint of the ♂s; they included a ♂ ab. *icarinus*.

2. *Plebeius agon*, var. *masseyi*, Tutt, the form from the northern mosses, the ♂s bright blue, with very narrow black border and conspicuous black marginal spots on the hindwing, the ♀s strongly suffused with blue, in most cases as extensively as in *Agriades coridon* ab. *semisyngrapha*; the underside of the ♂s was remarkably white; amongst the latter was an aberration having lead-coloured hindwings on the upperside, and two with some of the spots of the underside striated.

3. *Aricia medon*, Hüfn., from the Durham coast, including almost typical specimens; var. *salmacis*, as described by Stephens, the ♂ with a black discoidal spot on the upperside of the forewing, the ♀ with a white one; ab. *similis*, Tutt, the ♂ with a white discoidal spot; ab. *albiannulata*, Harr., with black discoidal ringed with white, so frequently described as var. *salmacis*, the original description of which excludes this form; ab. *vedræ*, Harr., with its extreme form ab. *obsoleta*, Obth., in which the spots of the forewing are missing on the underside, as well as those of the hindwing; ab. *semivedræ*, Harr.; and ab. *inclara*, Harr., with its silvery-white ground colour on the underside, this specimen being also somewhat striated. To these were added a few var. *artaxerxes*, F., from Kinghorn, on the coast of Fife.

Also a series of *Pieris napi*, L., from the latter locality, remarkable for the extent of the black markings on the forewings of the ♂ ♂, and the grey suffusion along the costa, inner margin, and nervures of the forewings of the ♀ ♀.

Mr. Fryer exhibited a fine striated underside aberration of *Polyommatus icarus*.

The Rev. A. T. Stiff exhibited :—

1. Series of varieties of *Epinephele tithonus*, taken at Tavistock in August, 1915, together with a long series of varieties taken in the same district in previous years. Colour variation was not so pronounced this year as in some former years, but the series included one lemon-yellow and two golden-yellow females, and both males and females in which the usually fuscous border was replaced by mouse-grey. Both males and females with one or two extra spots on the forewings were well-represented, but the most noticeable features of this year's collection were the unusually large size of the anal spots on the hindwings, and the presence in one or two females of a well-defined additional spot *below* the anal spot—a very rare variety. One female had no fewer than five spots on the hindwing, including this spot below the anal spot. In several cases the white specks on the underside of the hindwings were developed into well-defined streaks.

2. A specimen of *Ceunonympha pamphilus*, taken at Royston in August, with a double apical spot on the underside of the forewings.

3. A specimen of *Catocala nupta* taken at Leigh-on-Sea in September, with well-defined black streaks running from the angles of the submarginal line on the forewings to the series of marginal black linear spots. These spots were greatly intensified in size. The specimen had also three black transverse lines on the disc of the forewings.

The Rev. J. E. Tarbat exhibited :—

1. *Epinephele hyperantus*.—An underside of unusually light ground colour causing the ocelli to stand out very prominently.

2. *Abraxas grossulariata*.—A dark form and an ab. *varleyata*.

3. *Luperina testacea*.—Five very dark melanic forms taken at St. Anne's-on-Sea.

4. *Agrotis nigricans*.—A melanic specimen.

Mr. W. West (Lewisham), on behalf of the Society, exhibited ten cabinet drawers containing the collection of Canadian *Lepidoptera* presented to the Society in 1889 by Mr. Lachlan Gibb.

Mr. W. J. Kaye exhibited two large drawers of Morphos, including *Morpho cacia*; *M. adonis*, ♂ and ♀, the latter being extraordinarily rare, Mr. Kaye had himself seen numbers of living males, but never a ♀; *M. cypris*, males and females, the latter of the usual yellow, and also the very much rarer blue form; *M. sulkowskyi*, ♂ and ♀; *M. eros*, ♂; *M. aurora* and *M. aureola*, a

male of each; *M. uraneis*, a ♂, this was probably the rarest species of *Morpho*, and as it comes from the Upper Amazon, about Iquitos, it cannot be much overlooked, as large collections have been sent home from there; *M. cytheris*; *M. godarti*, ♂s and ♀; *M. aega*, ♂s and ♀s, the females of the latter were graduated from the yellow form to the extreme blue form, although usually rare, there were localities where the blue form was frequent and as common, if not commoner, than the usual yellow form. The remainder of the specimens were all geographical forms or supposed geographical forms of the old species, *M. menelaus*. The series consisted of some thirty examples of the following forms, *M. menelaus*, ♂ and ♀s, British Guiana; *M. menelaus* var. *amathonte*, Colombia; *M. menelaus*, var. *melacheilus*, Upper Amazon; *M. menelaus* var. *nestira*, S. E. Brazil; and *M. menelaus* var. *didius*, a variable series from Peru, besides the already mentioned *M. godarti*, which it was anticipated would be proved to be a geographical race of *M. menelaus*.

Mr. L. E. Dunster exhibited a series of *Agriades thetis* (*bellargus*), including specimens from Seaton, S. Devon, August, 1911, Pickett's Hole, May, 1914, and Ranmore, May and June, 1915, and August, 1915.

One female specimen was suffused with blue and had large red spots on the left hindwing. It was taken at Ranmore on June 6th, 1915, by Mr. G. Ingram, of Palmer's Green.

Mr. G. Talbot exhibited, on behalf of J. J. Joicey, Esq., numerous new and brilliant Lepidoptera from New Guinea.

1. The principal forms of the genus *Delias* found in New Guinea, illustrating 52 species.

2. The *Delias* inhabiting the Schouten Island, North New Guinea, represented by seven species, six of these having been recently described as new.

3. Four species of *Delias* new to science, from the Wandammen Mountains, Dutch New Guinea.

4. The principal forms of the genus *Milionia*, etc., found in New Guinea, illustrated by 37 species of the genera *Milionia*, *Callhistia*, *Lobocraspeda*, *Eubordeta*, *Craspedopsis*, and *Bordeta*.

5. A local race of *Papilio* (*Troides*) *paradisaea* from the Arfak Mountains, Dutch New Guinea; a new *Dicallaneura*, a new *Prataxila*, and a very distinct new *Diacrisia*, unlike any other known in the genus, all from Dutch New Guinea.

6. The largest New Guinea Pyrale—*Ethopia roseilinea*, Walk.

Mr. F. H. Stallman exhibited:—

1. *Amorpha (Smerinthus) populi*.—Eight ♂s and four ♀s bred in May and June, 1915, by his brother, Mr. E. C. Stallman, from ova laid by a wild ♀ from Dulwich, 1914. The parent was so damaged (through being washed down a garden drain), that the colouring could not be made out, but what there was of it seemed rather coppery. The specimens bred show, in the *males*, three of typical coloration, three of rather coppery tint, and two grey with olive markings. In the *females*, one rich copper, and three very pale olive tinted with indistinct markings. Included was a typical female from a dug pupa, Dulwich, for comparison.

2. *Boarmia abietaria*.—A series bred from larvæ beaten in the spring by Mr. J. G. St. Aubyn and himself from yew at Box Hill. The males show all forms from type to completely black.

3. *Boarmia gemmaria*.—A short series bred from larvæ obtained with the *abietaria*. There are greyish and ochreous forms in both sexes, but two females are var. *perfumaria*. One male has markings on upper wings formed into a narrow black band, there is a corresponding band on the lower wings.

4. Sixteen species of the genus *Eupithecia* bred during 1915, viz., *oblongata*, *pimpinellata*, *assimilata*, *absinthiata*, *goossensiata* (*minutata*), *albipunctata*, *rufigata* (very dark from Dulwich), *lariciata*, *castigata*, *satyrata*, *tenuiata* (series of 24 showing considerable range in colour and markings), *nanata*, *exiguata*, *sobrinata*, *pumilata*, and *coronata*—one specimen from larva collected with larvæ of *albipunctata* at Oxshott on September 11th, the imago emerging October 8th.

Mr. W. Schmassmann exhibited the following species and series of Exotic Rhopalocera:—

1. *Papilio memnon*—many of its female forms.

2. *Papilio memnon* ♀ f. *achates* and *P. coon*—from Java, and

3. *Papilio mayo* ♀, and *P. rhodifer*—from the Andamans, showing similar pattern and flying together in their respective localities.

4. *Cethosia leschenaultii*—from Wetar Island, showing curious resemblance to *Vanessa antiopa*.

5. *Argyrophorus argenteus*—a silver coloured Satyrid from Chili.

6. South-American *Nymphalidæ*, *Callithea optima*, *C. sapphira*, *C. degandii*, *C. davidi*, *C. batesia*, and *C. hemichryseis*.

Mr. C. B. Williams exhibited under the microscope:—

1. Several interesting species of Thrips (Thysanoptera), including the life history of the Pea Thrip, *Kakothrips pisivora*.

2. British species of Protura.

3. He also showed a pair of the dark chocolate variety (ab.

oliracea, Tutt) of *Lasiocampa* (*Bombyx*) *quercus* from the Cheshire coast sandhills, with the dark cocoon from which one of the above were bred, and a very dark coloured larva (preserved) similar to those which produced the melanic forms.

Mr. A. E. Gibbs exhibited a series of 56 specimens of *Agriades coridon*, selected from series taken in 1915, in or near the borders of Hertfordshire. Among the 47 specimens from Royston were examples of ab. *semi-syngrapha*, females showing series of blue spots inside the usual antemarginal ones, female with white fringe, rayed females, minor underside variations, including a ♀ in which the light borderings of the spots on the underside were coffee-colour, contrasting with very white-ringed specimens. Three specimens were from Dunstable, two of which, females, had one pair of wings smaller than the other. There were six examples from Aldbury, taken by Mr. A. J. Wightman. One is a male, and it has a well marked bright orange spot inside the second black antemarginal spot on hindwing; the second is a female, and has a row of quite brilliant little blue points adjoining the antemarginal band on hindwing. Other specimens have the discoidal spots conspicuously outlined in white.

Mr. A. Bacot exhibited living examples of the yellow-fever mosquito, *Stegomyia fasciata*, ova, larvæ, pupæ, and adults.

Mr. Stanley Edwards exhibited species of the *paris* group of the genus *Papilio*, including *P. ganesa*, *P. polyctor*, *P. arjuna*, *P. brama*, *P. arcturus*, all from India, *P. peranthus* from Java, *P. montanus* from Ceylon, and *P. bianor* from China and Japan. He also showed the Palæarctic form of *P. paris* from Thibet with the spring form, var. *vernalis*, and the local race, var. *karna*, from Java.

Mr. E. J. Salisbury, D.Sc., gave an exhibit illustrating the Variation in the Seedlings of *Zea mais*, and contributed the following notes:—

“The embryo of grasses has been variously interpreted. The Scutellum is by some regarded as the Cotyledon, and by others as only part of the cotyledon. The first green structure or coleoptile is in the latter view regarded as the sheath of the modified first leaf or scutellum.

“If the scutellum be regarded as constituting the entire cotyledon then we have the difficulty of two leaves, viz., scutellum and coleoptile superposed. That the scutellum is part of the cotyledon is supported by its origin being terminal, as is the single cotyledon in other monocotyledons.

"Comparison with the embryo of sedges also supports the view that the scutellum and coleoptile together represent the cotyledon.

"As a result of her anatomical study of the seedlings of monocotyledons, Miss Sargeant came to the conclusion that the single cotyledon was the result of fusion of two cotyledons. The specimen exhibited shows a seedling of *Zea mais* in which the cotyledon sheath (coleoptile) is bifurcated at the apex, and possesses two vascular strands throughout its length. Numerous seedlings raised at the same time as the specimen exhibited showed the same phenomenon, though the degree of bifurcation varied. In all cases, however, there were two vascular strands.

"The case in question cannot therefore be regarded as a mere monstrosity, and may well be in the nature of a reversion to the ancestral condition."

Mr. Robert Adkin exhibited eight representative series of families of *Boarmia gemmaria* reared through successive years from captured females of the black form. He said that the present exhibit was in continuation of one that he made five years ago ("Proc.," 1910, p. 151). The race that he was then dealing with had become weakened by interbreeding, and appeared to be on the point of dying out, and as a matter of fact five moths only, all of the black form, were reared in 1911, these, however, formed the one stock from which the series now exhibited were descended, and would be referred to as X. The other stock was obtained from a female of the black form taken wild in 1910, and from the ova which she deposited a brood consisting of 67% typical and 33% black imagines were reared in 1911, and which will be referred to as Z.

A. B. C. brood. Three typical males Z were paired with three black females X, and in 1912 produced a brood of black imagines of which 39% were males and 61% females, the black characters in the weakly stock X thus apparently for the time overcoming the typical characters in the more robust stock Z.

D brood. A black male Z was paired with a typical female Z, and in 1912 produced a brood consisting of 44% typical (66% male and 34% female) and 56% black (49% male and 51% female).

E brood. A black male and female A.B.C. were paired, and in 1913 produced a brood of which 22% were typical (70% male and 30% female) and 78% black (75% male and 25% female), thus it will be seen that although no typical characters had been intentionally introduced they had reasserted themselves in the second generation.

G brood. A black male A.B.C. was paired with a black female D, and in 1913 produced 50% typical (42% male and 58% female)

and 50% black (42% male and 58% female). It will be noted that this was a very symmetrical brood, both in regard to the numbers of typical and black imagines and the relative proportion of sexes in each.

H brood. A black male D was paired with a black female A.B.C. and in 1913 produced 29% typical (53% male and 47% female) and 71% black (54% male and 46% female), the typical strain in D brood, as might be expected, not being overcome in this generation.

J brood. A typical male D was paired with a black female A.B.C. and in 1913 produced 62% typical (40% male and 60% female) and 38% black (40% male and 60% female), showing that the typical strain when reintroduced at once asserted itself.

K brood. A black male H was paired with a black female H, and in 1914 produced a wholly black brood (47% male and 53% female), the typical characters thus being eliminated in the third generation of breeding black with black.

M brood. A black male J was paired with a black female G, and in 1914 produced 29% typical (17% male and 83% female) and 71% black (29% male and 80% female), the introduction of the typical element in the second generation thus continuing to assert itself.

Both of the 1914 broods were beginning to show signs of weakness, and the experiments were therefore not continued further.

Mr. F. W. Frohawk exhibited—

1. *Lycaena arion*. A long series of 44 males and 44 females from Cornwall, showing the variation this species is subject to as regards the markings, ranging from spotless males to heavily spotted males, equalling those (with spots) of normal females in size. Females with spots similar to normal males and a gradual increase in the spots to large club-shaped markings, the spots also ranging from five to ten in number in the forewing.

The spotless form does not occur in the female.

Also a series of dwarf examples of both sexes, which occur yearly in the Cornish locality. These are much duller in colour, in the males all markings are pale and somewhat indistinct. The females are generally of dusky appearance.

2. A fine variety of *Gonepteryx rhamni*, similar in colour to the species *G. cleopatra*. The specimen was captured at Aldeburgh, Suffolk, August, 1896.

Mr. C. P. Pickett exhibited very long series of *Agriades coridon* from Hertfordshire, taken mainly in August, 1915, as follows:—

1. Sixty-six ab. *roystonensis*, asymmetrical gynandromorph

females, in which one side has smaller wings with blue scaling of the male and androconia.

32 specimens had R side wings smaller.

12	"	"	L	"	"	"
1	"	"	R	"	hindwing	"
2	"	"	L	"	"	"
13	"	"	R	"	forewing	"
5	"	"	L	"	"	"
1	"	"	R	"	hindwing	"
	and	"	L	"	forewing	"

This last was a most curious and unique specimen.

2. Fourteen ab. *inaqualis*, females with normal sized wings but asymmetrical splashes of male colour, all gynandromorphic.

5 splashed blue on R side forewing.

1 " " " R " hindwing.

1 " " " R " fore- and hindwings.

3 " " " L " hindwing.

4 " " " L " forewing.

3. A series of female aberrations not falling under the above categories, including—

Two very light golden-brown forms.

Several with golden-brown patches.

Two uniformly very dark.

Several white-rayed examples (quite a new form).

Several partial ab. *semisyngrapha*.

Several ab. *semisyngrapha* with very pronounced red lunules.

Two complete ab. *obsoleta*.

Several with blackish-gray undersides.

Several ab. *striata* and ab. *minor*.

4. A series of male aberrations including—

Specimens of various shades of blue from whitish to sky-blue.

Several ab. *suffusa* and ab. *minor* and ab. *pallida*.

Five ab. *obsoleta* (all four wings).

Three ab. *obsoleta* (lower wings only).

Two very dark grey undersides.

Four approaching ab. *fowleri*.

All other aberrations named by Tutt.

5. Series of *Abraxas grossulariata* bred from Aberdeen of the very dark race, containing ab. *varleyata* and forms approaching it.

6. A long series of *Angerona prunaria* showing the results, after

18 years, of strict inbreeding, together with the results of subjecting the larvæ to colour environment. Those larvæ that were fed up under orange coloured muslin have a great tendency to produce imagines of a deeper orange. Those fed under green muslin produced imagines all much lighter and the orange shade entirely absent. Those fed under red muslin produced imagines all deep reddish-orange in the males and deep chocolate banded in the females. The ab. *picketteria*, a half-banded form, of which a long series was shown, is now a constant strain, the deep orange ground colour in the females gives them a striking appearance.

DECEMBER 9th, 1915.

Mr. R. ADKIN, F.E.S., in the chair.

The decease of a member Professor Meldola was announced.

Mr. F. W. Frohawk exhibited a remarkable female aberration of *Papilio machaon* in which the ground colour was of a dark cinnamon-brown, it was bred from Wicken Fen in 1895; a male form of the same species with odd coloured anal angle blotches on the hind-wings, the right side being deep ochreous-yellow, the left side dark Indian-red; and another male with both anal blotches of a pale ochre-yellow, both the latter were also from Wicken Fen. He also showed three *Colias hyale* and one *C. edusa* blotched with crimson, and a coloured diagram showing the magnified scales of different colours, varying from yellow to crimson, some single scales of the latter colour were isolated and scattered round the edge of the blotch. Mr. Frohawk was of opinion that the abnormal colour was not, as had been previously conjectured, the result of a stain. Reference was made by members to the red of a similar brilliancy and tint, occurring naturally on the costa of *Gonepteryx rhauni* and in some South American Pierids of the genus *Catopsilia*.

Mr. Hugh Main exhibited a cage which he had had made to enable him to watch the excavation of its burrows by *Geotrupes* sp., and explained his method of observation with some of the results so far obtained by him.

Mr. B. S. Williams exhibited an example of *Ephyra pendularia* var. *subroseata* which he had bred from a wild larva beaten in the autumn of 1914, in Surrey.

Mr. Dunster exhibited dwarf specimens of—

Pieris napi, ♂ measuring $1\frac{3}{8}$ th of an inch across the wings, taken at Mill Hill, Middlesex, on May 9th, 1915.

Polyommatus icarus ♂, measuring only $\frac{7}{8}$ th of an inch across the wings, taken at Horsley, May 23rd, 1915.

Some upperside aberrations of *P. icarus* females, taken at Ranmore, June 6th, 1915, High Wycombe, September 5th, 1915, and Hoylelake, Cheshire, August 5th, 1915.

Some underside aberrations of *P. icarus* males, taken at Ranmore, June 6th, 1915.

Some underside aberrations of *P. icarus* females, taken at Ranmore, June 6th, 1915, Beaconsfield, August 21st, 1915.

A lilac tinted ♂ specimen of *Plebeius agon*, taken at Oxshott, July 4th, 1915.

Mr. F. H. Stallman exhibited, at the request of Mr. F. W. Frohawk, a specimen of *Lycena arion* ♀, to place on record the extremely late date of capture, *viz.*, August 25th, 1915. The previous latest date for capture of the imago known to Mr. Frohawk being August 15th. The specimen exhibited was taken in North Cornwall by his brother, Mr. E. C. Stallman, and was the only specimen seen during his stay there from August 25th to September 1st. It is to be noted that the specimen shows no appreciable sign of wear and cannot have been out of pupa for long.

It was the opinion of members that possibly the larva of this specimen had been an exceptionally slow feeder, and that any offspring which it might have would inevitably be doomed to succumb as the food-plant of the earlier larval period, thyme, dies early in the autumn.

Mr. R. Adkin exhibited a melanic specimen of *Thera variata* (*obeliscata*) which he found at rest on the frame work of a window in his house at Lewisham, where it had no doubt been attracted to light, on June 8th, 1915. The specimen was fully as dark as the melanic Paisley race, and showed great contrast with the forms commonly found in the Kent and Surrey pine woods, specimens of which were shown for comparison. He said that the only coniferous trees of which he was aware in the neighbourhood of his house were a few isolated examples of foreign species that were grown in adjacent gardens for ornamental purposes.

It was remarked that a melanic form of the same species had been reported from Eltham, taken in a garden among fir trees, and that at Finchley, where fir trees were existent in numerous gardens, etc., *T. variata* (*obeliscata*), *Semiothisa liturata*, and *Ellopiopsis prosapia* (*fasciaria*) had been met with.

JANUARY 13th, 1916.

Mr. A. E. GIBBS, F.L.S., F.E.S., *Vice-president*, in the chair.

The death of Mr. A. C. Morris, of Norwood, a life member, was announced. He was killed in action in France.

Mr. Leeds exhibited an exceedingly rare form of gynandromorphism shown in a specimen of *Agriades coridon*, taken at Royston, Herts, in 1915. Blue markings were present on both the upper wings only, the lower wings being completely female in colour. The female element predominated and the ground colour was strongly dark. Androconial scales were detected on both forewings. The fringes were dusky and the underside rather darker than usual. Mr. Leeds also exhibited a series of undersides of the same species to show the variation in general ground colour of the Hertfordshire races.

Mr. C. B. Williams pointed out that it would be interesting to know if dorsal-ventral gynandromorphism occurred in the Lepidoptera.

Mr. A. E. Gibbs exhibited an interesting letter in his possession written by Henry Doubleday to Bernard Piffard, giving information as to the famous Hewitson collection.

Mr. Buckstone exhibited two small and dark suffused specimens of *Polyphoca flavicornis* bred from full-fed larvæ taken at Peaslake, Surrey, and a curious semitransparent example of *Gonodontis bidentata* bred from an ovum laid by a female taken at Horsley, Surrey.

Mr. Buckstone also exhibited several short series of *Zygana trifolii* taken in several Surrey localities, and contributed the following note:—

“At Swinley Woods, Ascot, the larvæ of *Zygana trifolii* spin up close to the ground, but a few cocoons may be found high up on grass, heather and low shrubs. From two dozen of such cocoons I bred the four female specimens exhibited. The remaining cocoons produced a species of Diptera of which I show a specimen. For comparison I have placed in the box specimens of *Z. trifolii* captured at the following places—Swinley Woods, Pickett's Hole and Esher. Also a few specimens of *Z. lonicera*. It will be noticed that one of the bred specimens of *Z. trifolii* has narrower and more pointed wings than have any of the *Z. lonicera*. With regard to the antennæ those from Pickett's Hole have the shortest antennæ, and those from Esher the longest.”

Mr. A. E. Gibbs exhibited series of—

1. *Melanargia syllius*, Hbst., from France, Central Spain, and the

Pyrenees, including an example of the form without ocelli, ab. *ixora*, taken at Ille-sur-Tet, Pyrénées Orientales.

2. *M. meridionalis*, Feld., Chang-Yang, China.

3. *M. lachesis*, Hb., Pyrenees, including the yellow form *canigulensis*, Obth., also ab. *catalenca*, Stgr., with markings suppressed on hindwing beneath, and corresponding to the form *leucomelas* of *galathea*, from Central Spain.

4. *M. ines*, Hfmg., from Central Spain.

5. *M. parce*, Stgr., from Tian-Shan.

6. *M. arge*, Sulz., from Spain and Central Italy.

7. *M. japygia*, Cyr., from Spain and Sicily, with its forms *savarovius*, Hbst., from Central and North-Eastern Russia, and *transcaspica*, Stgr., from Turkistan.

8. *M. larissa*, Hb. Gey., from the Balkans, and its western lighter var. *herta*, Hub. Geg., from Ragusa, Dalmatia.

Mr. Curwen exhibited species of the same genus and including—

1. *M. galathea*, British and continental, including var. *procida*, from North Italy, a form with obsolescent eye-spots near ab. *galene*, and from Spain ab. *leucomelas*.

2. *M. lachesis*, a form approaching ab. *catalenca*.

3. *M. larissa* var. *herta*.

4. *M. titea*, from Asia Minor, an unusually strongly marked and small form of this species.

Mr. Hy. J. Turner exhibited species of the same genus, and including—

1. *M. galathea* var. *galene*, with the eye-spots represented by mere traces, ab. *leucomelas*, from the Pyrenees, and a large form from the Balkans approaching var. *turcica*.

2. *M. titea*, the usual large somewhat dull species from Asia Minor.

In his remarks he noted that there was no striking aberration in the whole genus such as occurred in the Vanessids, *Pyrameis atalanta*, *P. cardui*, etc., but that the whole of the variation might be summed up in the words "extension or diminution of the black coloration in area and intensity and the variation of white to yellow." Various authors had named steps in this continuous line of forms in the species of *galathea* which perhaps might be thus arranged:—

Intensity and amount of black.—*leucomelas*; *galene*; *galathea*; *procida*, *galaxarra*, *nicoleti*; *syriaca*, *turcica*; *nigricans*; *melaina*; *lugens*.

Size.—*syriaca*; *galathea*; *syracusana*, *lucasi* (*mauretunica*).

Colour.—*fulva* ; *fulvata*, var. β of Stephens' "Illus."

Markings.—*amarginata*, *vispardi*.

Mr. Frohawk exhibited a picked series of *M. galathea* from Britain which showed the variation of the ground colour, from very pure silvery-white through white, creamy-white, clear lemon-yellow to buff-yellow, and noted that otherwise the species in this country was not prone to variation or aberration. There did however exist a pure white specimen, which was taken in the forties, and also a wholly black specimen taken in Kent, ab. *lugens*. He said that it might not be generally known that the larvæ hatched in the last days of August and went at once into hibernation. They fixed themselves on dead grass stems to which they exactly assimilated in colour and *never* on the green blades. At the beginning of the new year, about this time in January, they started to feed.

The Rev. G. Wheeler exhibited examples of var. *lucasi* (*mauretanica*) of *M. galathea* from Algeria, and also his unique aberration of *M. galathea* in which the left side was completely ab. *lugens*, the wholly black form, while the right side was predominantly black but considerably and irregularly streaked and blotched with the dull white of the typical ground colour.

Mr. Platt Barrett exhibited his collection of the same genus, calling attention to a unique form of *M. galathea* (see pl. xii.) taken many years ago in Kent, which closely resembled the Spanish *M. lachesis* in having a broad white band across all four wings, and also to the various forms of the several species with which he was familiar in South Italy and Sicily, as follows:—

Melanargia (*Arge*) *galathea* = English—type form = Kent, 1859, 1880, 1900-1915; Surrey, 1870; Gloucestershire, 1912. Variety (one only), Kent, 1875, all pale forms; also Brigue, Switzerland, 1909 (pale form); and Vienna, Austria (pale form 1913). Dark form = var. *procida* = Berisal, 1911 and 1914; Tuscany, 1911; Calabria, at sea level, 1,000ft. and 2,000ft. with some var. *turcica*, 1911 and 1914; Sicily, specimens chiefly *procida*, with large females from eight different localities, 1912, 1913, and 1914, including *syracusana*, Zeller, 1910, 1911, 1912, 1913, and 1914.

M. japygia.—Sicily (large and dark), 1911-1914, France, Brindisi, etc.

M. pherusa.—Sicily, Palermo, 1910-1914, also var. *plesaura*.

M. arge.—C. Italy, Sorrento, 1913; Calabria, various localities, 1910-1914.

M. larissa.—Var. *herta*—one specimen.

M. lachesis.—Two specimens.

M. syllius.—Two specimens.

M. ines.—Two specimens.

Mr. Barrett then read a paper on the genus *Melanargia*. (See page 55).

Proposing a vote of thanks to Mr. Barrett for his instructive and humorous account of his experiences with the genus, especially in Sicily, Mr. H. Rowland-Brown said that he had not much difficulty in deriving the whole group from one primitive ancestor. The genus probably had its origin in northern Asia Minor, spreading thence over the Balkan peninsula, and east and west along the northern Mediterranean coasts, the Alps of Central Europe, etc. He did not consider that the Algerian *A. lucasi*, Rbr., was the result of an extension along the north African coast region, but that it had probably found its way there *via* the Italian peninsula, Sicily, and the now submerged "bridge" which connected Sicily with the African mainland of to-day; a probability heightened by the extraordinary similarity of *M. galathea*, the fine form of Sicily, and *M. lucasi*. Mr. Barrett's exhibits confirmed his own conclusions that the two "species" are, in fact, identical; at all events they appeared to be superficially inseparable, and the breeding experiments of Mr. H. Powell, of Hyères, disclosed identical forms of larva and pupa, varying only in size. He also regarded *M. lachesis* as a species recently evolved from the *galathea* form, which spreads westwards to the Bay of Biscay, and which at a certain point in the Pyrénées-Orientales overlaps, and apparently produces by interbreeding a race intermediate between the two. The wonderful *lachesis*-like aberration of *M. galathea*, taken by Mr. Barrett in Kent in 1875, exhibited that evening, suggested the close affinity of the now separate species.

Mr. Rowland-Brown also remarked that the brown coloured form of *M. galathea* (= var. *fulvata*) occurred not uncommonly in Cantal, the mountains south of Auvergne, on volcanic formation; while the form with silvery-white ground colour he had taken at Le Lioran, as well as on the roadside between Huntingdon and Abbots Repton, in July, 1899.

JANUARY 27th, 1916.

ANNUAL MEETING.

Mr. R. ADKIN, F.E.S., in the chair.

The meeting was devoted to the business of receiving and adopting the Reports of the Council and Officers for the past year, and

the announcement of the results of the election of the Officers and Council for the ensuing year.

In the unavoidable absence of the President and the fact that there was no presidential address, Mr. Hy. J. Turner read a series of extracts showing the views of the non-entomological world on entomologists and the objects of their study.

The following is a list of the members elected as Officers and Council of the Society for the Session 1916-17.

President.—Hy. J. Turner, F.E.S.

Vice-presidents.—R. Adkin, F.E.S., and A. E. Gibbs, F.L.S., F.Z.S., F.E.S.

Treasurer.—T. W. Hall, F.E.S.

Librarian.—A. W. Dods.

Curator.—W. West (Greenwich).

Editor of Proceedings.—Hy. J. Turner, F.E.S.

Hon. Secretary.—Stanley Edwards, F.L.S., F.Z.S., F.E.S.

Council.—S. R. Ashby, F.E.S., B. S. Curwen, F. W. Frohawk, F.E.S., M.B.O.U., W. J. Kaye, F.E.S., D. R. Morford, W. G. Sheldon, F.E.S., F. H. Stallman, A. E. Tonge, F.E.S., C. B. Williams, B.A., F.E.S.

Votes of thanks were accorded to the President, Treasurer, Secretaries and other officers.

ORDINARY MEETING.

Mr. Hy. J. Turner, F.E.S., *President*, in the chair.

Mr. Edwards exhibited a copy of Brongniart's History of Fossil Insects, calling particular attention to the plates containing details of the huge dragon fly, *Meganeura monyi*, which measured quite two feet in expanse of wing.

Mr. C. B. Williams remarked upon the wonderful state of preservation of species of thrips in the amber of Königsberg. It was quite possible to examine the details with a microscope up to $\frac{1}{8}$ in. and find even the minute hairs just as perfect to-day as they were in the living specimens.

Mr. W. J. Kaye exhibited specimens of the three species of *Caligo* occurring in Trinidad, viz., *C. braziliensis* sub-sp. *minor*, Kaye, *C. ilioneus* sub-sp. *saltus*, Kaye, and *C. teucer* sub-sp. *insulanus*. There had been great confusion between the first and last of these. Mr. Kaye's sub-species *minor* had been sunk by Stichel as synonymous with his *C. teucer* sub-sp. *insulanus*, but Lord Rothschild, who has

the type of *insulanus* at Tring, has discovered that the sub-sp. *minor*, which he has now seen, is quite distinct, and must be considered as a form of *braziliensis*. But *C. eurilochus* and *C. braziliensis*, Lord Rothschild finds, to be distinct species. Quite recently Fruhstorfer had described from Trinidad a form of *C. eurilochus* as sub-sp. *phryasus*, the type of which is also at Tring, and which turns out to be the same as Mr. Kaye's *eurilochus*, now known as *braziliensis* sub-sp. *minor*.

Mr. Brooks showed a specimen of *Papilio machaon* found by him impaled on a thorn-bush in the Fen district. It was in excellent condition. Presumably it had been caught and impaled by a species of Shrike.

Mr. F. H. Stallman exhibited a short series of *Ilythya semirubella* (*carnella*) from Pickett's Hole, Surrey, July 12th, 1914, and Box Hill, August 1st, 1915. There was considerable colour variation in the specimens, and one specimen had a beautiful fairly wide snow-white streak along the costa. This is said to be not uncommon in some localities, and known on the continent as *ab. icterella*.

Messrs. Sich, Newman and others made remarks on the unusual season.

At Hampstead *Hibernia leucophaëaria* had been met with on January 19th, and fourteen specimens were noted at Bexley about the same time. Among other records were:—Larvæ of *Callimorpha dominula* already out of hibernation and feeding, *Dimorpha versicolora* had been bred, as also had numbers of *Tephrosia crepuscularia* (out doors), the larvæ of *Arctia caja* were feeding on suitable days, and those of *Abraxas grossulariata* were moving on January 1st.

Mr. R. Adkin exhibited a specimen of *Polygonia c-album* taken in his garden at Hodeslea, Eastbourne, on September 18th last year, and read a paper entitled "Autumn Butterflies at Eastbourne and some other Notes." (See page 62.)

DECEMBER 9th, 1915.

ADDENDUM.

Mr. W. J. Lucas communicated a paper, "British Crickets." (See page 50.)

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CORRECTION.

Proceedings, 1914-15.

On Plate VIII., Fig. 3, for *C. nigricella* read *C. bicolorella*.

Proceedings, 1915-16.

p. 59, line 44, for *turca* read *turcica*.

p. 74, ,, 38, ,, *agrippini* read *agrippina*.

p. 144, ,, 13, ,, *Ilythia* read *Ilithia*.

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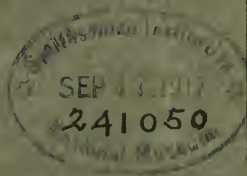
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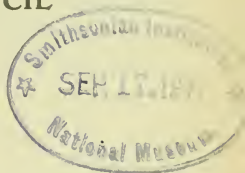
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S. EDWARDS, F.L.S., F.Z.S., F.E.S., etc. (*General Sec.*),
15, St. German's Place, Blackheath, S.E. 3



THE SOUTH LONDON

ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY,

HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.

The Society has for its object the diffusion of Biological Science, by means of Papers and Discussions, and the formation of Typical Collections. There is a Library for the use of Members. Meetings of the Members are held on the 2nd and 4th Thursday evenings in each month, from Seven to Ten p.m., at the above address. The Society's Rooms are easy of access from all parts of London, and the Council cordially invites the co-operation of all Naturalists, especially those who are willing to further the objects of the Society by reading Papers and exhibiting Specimens.

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1877 .. J. P. BARRETT, F.E.S. (dec.).	1896 .. R. SOUTH, F.E.S.
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1883 .. J. R. WELLMAN (dec.).	1902 .. F. NOAD CLARK.
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1890 .. J. T. CARRINGTON, F.L.S. (dec.)	1908-9.. A. SICH, F.E.S.
1891 .. W. H. TUGWELL, Ph.C. (dec.)	1910-11. W. J. KAYE, F.E.S.
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LIST OF MEMBERS.

—•—

Chief subjects of Study :—*h*, Hymenoptera ; *o*, Orthoptera ; *he*, Hemiptera ; *n*, Neuroptera ; *c*, Coleoptera ; *d*, Diptera ; *l*, Lepidoptera ; *ool*, Oology ; *orn*, Ornithology ; *r*, Reptilia ; *m*, Mollusca ; *cr*, Crustacea ; *b*, Botany ; *mi*, Microscopy ; *e*, signifies Exotic forms.

—•—

YEAR OF
ELECTION.

- 1886 ADKIN, B. W., F.E.S., Trenowith, Hope Park, Bromley, Kent.
l, orn.
- 1882 ADKIN, R., F.E.S., *Vice-president*, Wellfield, 4, Lingard's Rd.,
Lewisham, S.E. 13, and Hodeslea, Meads, Eastbourne. *l.*
- 1901 ADKIN, R. A., Hodeslea, Meads, Eastbourne. *m.*
- 1907 ANDREWS, H. W., F.E.S., Shirley, Welling, Kent. *d.*
- 1914 ARCHER, T. H., 52, Elsenham Street, Southfields, S.W. 18. *l.*
- 1901 ARMSTRONG, Capt. R. R., B.A., B.C. (Cantab), M.R.C.S.,
F.R.C.P., 55, Granville Park, Lewisham, S.E. 13. *e, l.*
- 1895 ASHEY, S. R., F.E.S., 119, Greenvale Road, Eltham Park,
Kent, 9. *c, l.*
- 1895 ASHDOWN, W. J., Belmont Road, Leatherhead. *l, c, he.*
- 1888 ATMORE, E. A., F.E.S., 48, High Street, King's Lynn, Nor-
folk. *l.*
- 1896 BARNETT, T. L., 19, Osmond Gardens, Wallington, Surrey. *l.*
- 1887 BARREN, H. E., 78, Lyndhurst Road, Peckham, S.E. 15. *l.*
- 1912 BATESON, Dr. W., F.R.S., F.L.S., F.E.S., The Manor House,
Merton, Surrey. (*Hon. Member.*)
- 1911 BLAIR, K. G., B.Sc., F.E.S., 23, West Hill, Highgate,
N. 6. *n, c.*
- 1911 BLENKARN, S. A., F.E.S., Norham, Cromwell Road, Becken-
ham, Kent. *l.*
- 1898 BLISS, M. F., F.E.S., Coningsburgh, Montpelier Road, Ealing,
W. 5. *l.*

YEAR OF
ELECTION.

- 1895 BOWMAN, K., The May Sharp Construction Co. Ltd., Edmonton, Alta, Canada. *l*.
- 1909 BOWMAN, R. T., 108, Station Road, Chingford. *l*.
- 1891 BRIGGS, H. M., 8, High Street, Canterbury. *l, orn.*
- 1887 BRIGGS, T. H., M.A., F.E.S., Rock House, Lynmouth, R.S.O., N. Devon. *l*.
- 1909 BRIGHT, P. M., F.E.S., Cheriton, Porchester Road, Bournemouth. *l*.
- 1913 BROOKS, GEORGE, 28, Hilton Avenue, Friern Barnet. *l*.
- 1900 BROWNE, G. B., Thorndene, S. Benfleet, Essex. *l*.
- 1909 BUCKSTONE, A. A. W., 307A, Kingston Road, Merton Park, Wimbledon, SW. 19. *l*.
- 1915 BUNNETT, E. J., M.A., 9, London Road, Forest Hill, S.E. 23. *mi*.
- 1890 BUTLER, W. E., F.E.S., Hayling House, Oxford Road, Reading. *l, c*.
- 1889 CANT, A., F.E.S., 33, Festing Road, Putney, S.W. 15. *l, mi*.
- 1910 CARDEW, Major P. A., East Hill House, Queenstown, Co. Cork. *l*.
- 1886 CARPENTER, J. H., F.E.S., Redcot, Belmont Road, Leatherhead, Surrey. *l*.
- 1899 CARR, F. B., 46, Handen Road, Lee, S.E. 12. *l*.
- 1899 CARR, Rev. F. M. B., M.A., L.Th., The Vicarage, Alvanley, Nr. Helsby, Cheshire. *l, n*.
- 1897 CHAPMAN, T. A., M.D., F.E.S., F.Z.S., Betula, Reigate, Surrey. *l*.
- 1879 CLODE, W. (*Life member*.)
- 1915 COCKAYNE, E. A., M.D., F.E.S., 16, Cambridge Square, W. 2. *l*.
- 1899 COLTHRUP, C. W., 103, Woodward Road, E. Dulwich, S.E. 22. *l, ool, orn*.
- 1907 COOTE, F. D., 25, Pendle Road, Streatham, S.W. 6. *l, b*.
- 1909 COULSEN, F. J., 17, Birdhurst Road, Colliers Wood, Merton, S.W. 19. *l*.
- 1902 COWHAM, F. W., 118, Minard Road, Hither Green, S.E. 13. *l*.
- 1911 COXHEAD, G. W., 36, Linthorpe Road, Stamford Hill, N. 16. *c*.
- 1899 CRABTREE, B. H., F.E.S., Cringle Lodge, Levenshulme, Manchester. *l*.
- 1898 CROW, E. J., 26, Tindal Street, North Brixton, S.W. 9. *l*.
- 1910 CURWEN, B. S., 9, Lebanon Park, Twickenham. *l*.

YEAR OF
ELECTION.

- 1917 DARWALL, Rev. D. M., Dagpole, Barclay Oval, Woodford Wells. *l.*
- 1888 DAWSON, W. G., F.E.S., The Manor House, Upper Wick, Worcester. (*Life member.*) *l.*
- 1900 DAY, F. H., F.E.S., 26, Currock Terrace, Carlisle. *l, c.*
- 1912 DEXTER, S., 13, Bankwill Road, Lee, S.E. 12.
- 1889 DENNIS, A. W., 56, Romney Buildings, Millbank, S.W. 1.
l, mi, b.
- 1901 DODS, A. W., *Hon. Librarian*, 88, Alkham Road, Stamford Hill, N. 16. *l.*
- 1912 DUNSTER, L. E., 44, St. John's Wood Terrace, N.W. 3. *l.*
- 1904 EAST, F. J., 69, Cazenove Road, Stamford Hill, N. 16. *l.*
- 1886 EDWARDS, S., F.L.S., F.Z.S., F.E.S., *Hon. Sec.*, 15, St. German's Place, Blackheath, S.E. 3. *l, cl.*
- 1914 EMMETT, C. P., F.E.S., Messrs. Cox & Co., Charing Cross, S.W. 1. *l.*
- 1915 FAGG, T. A., 55, Mt. Pleasant Road, Lewisham, S.E. 13. *l.*
- 1887 FLETCHER, W. H. B., M.A., F.E.S., Aldwick Manor, Bognor, Sussex. (*Life member.*) *l.*
- 1889 FORD, A., South View, Irving Road, West Southbourne, Bournemouth, Hants. *l, c.*
- 1915 FOSTER, T. B., Parkview Road, Addiscombe, Croydon. *l.*
- 1907 FOUNTAINE, Miss M. E., F.E.S., 1, Myola via Cairns, N. Queensland, Australia. *l.*
- 1912 FREEMAN, C. N., 54 5, Coleman Street, E.C. 2. *l.*
- 1886 FREMLIN, Major H. S., M.R.C.S., L.R.C.P., F.E.S., The Elms, Kingsbury, N.W. 9. *l, mi.*
- 1912 FROHAWK, F. W., M.B.O.U., F.E.S., *Vice-president*, Stanley House, Park Road, Wallington, Surrey. *l, orn.*
- 1915 FRYER, GORDON, L. D. S., 52, London Road, Twickenham. *l.*
- 1914 FRYER, J. C. F., Craven House, Northumberland Av., S.W. 2. *l.*
- 1911 GAHAN, C. J., M.A., F.E.S., British Museum (Natural History), South Kensington, S.W. 7. *c.*
- 1912 GARDNER, J. E., 204, Evering Road, Upper Clapton, N.E. 5.
- 1884 GIBB, L., F.E.S., 33, Blackheath Park, S.E. 3. (*Life member.*) *l.*
- 1908 GOFFE, E. R., 160, Ramsey Drive, Westcliff-on-Sea, Essex. *l.*

YEAR OF
ELECTION.

- 1908 GREEN, E. D., 17, Manor Park, Lee, S.E. 13. *l.*
- 1888 HALL, A. E., F.E.S., F.R.H.S., Cranfield House, Southwell, Notts. *l.*
- 1884 HALL, T. W., F.E.S., *Hon. Treasurer*, Stanhope, the Crescent, Croydon, Surrey; and 61, West Smithfield, E.C. 1. *l.*
- 1891 HAMM, A. H., 22, Southfields Road, Oxford. *l.*
- 1906 HAMMOND, L., Letchmere, Alden Lane, Purley. *l.*
- 1903 HARE, E. J., F.E.S., 7, New Square, Lincoln's Inn, W.C. 2. *l.*
- 1911 HARRIS, P. F.
- 1913 HAYNES, E. B., 17, Denmark Avenue, Wimbledon, S.W. 19. *l.*
- 1905 HILL, E., Roseneath, 3, Dorville Road, Lee, S.E. 13. *l.*
- 1888 HILLMAN, T. S., F.E.S., 11, Eastgate Street, Lewes, Sussex. *l.*
- 1911 HOLDING, A., 95, Kyverdale Road, Stoke Newington, N. 16. *l.*
- 1889 HORNE, A., F.E.S., 60, Gladstone Place, Aberdeen. *l.*
- 1910 HUMM, P. S., L.D.S., 56, Victoria Street, Westminster, S.W. 1. *l.*
- 1914 JACKSON, W. H., Holmfield, Plough Road, Purley, Surrey. *l.*
- 1886 JÄGER, J., 65, St. Quentin's Avenue, North Kensington, W. 10. *l.*
- 1886 KANE, W. F. DE V., M.A., F.E.S., M.R.I.A., Dadmans, Sittingbourne, Kent. *l, m, marine invertebrata.*
- 1898 KAYE, W. J., F.E.S., Caracas, Ditton Hill, Surbiton, Surrey. *l, S. American l.*
- 1900 KEMP, S. W., B.A., F.E.S., Indian Museum, Calcutta. *l, c.*
- 1910 KIDNER, A. R., The Oaks, Station Road, Sidcup, Kent. *l.*
- 1914 LEEDS, H. A., 2, Pendcroft Road, Knebworth, Herts. *l.*
- 1911 LESLIE, J. H., F.E.S., 84, Huron Road, Tooting Common, S.W. 17. *l.*
- 1896 LUCAS, W. J., B.A., F.E.S., 28, Knight's Park, Kingston-on-Thames. *Brit. o., odonata, n, m, b.*
- 1892 MAIN, H., B.Sc., F.E.S., Almondale, Buckingham Road, S. Woodford, Essex. *l.*
- 1886 MANGER, W. T., 100, Manor Road, New Cross, S.E. 4. *l, c, cr.*
- 1889 MANSBRIDGE, W., F.E.S., 4, Norwich Road, Wavertree, Liverpool. *l.*
- 1916 MASON, G. W., 99, Seaford Road, Ealing, W. 5. *l.*
- 1885 MERA, A. W., Outwood, High Road, Loughton, Essex. *l.*

YEAR OF
ELECTION.

- 1881 MILES, W. H., F.E.S., 7, Church Lane, Calcutta. Post Box 126. *mi, b.*
- 1880 MONTIERO, A. A. DE C., F.E.S., 70, Rua do Alecrim, Lisbon.
- 1889 MOORE, H., F.E.S., 12, Lower Road, Rotherhithe, S.E. 16.
l, h, d, e l, e h, e d, mi.
- 1910 MORFORD, D. R., 16, Spencer Road, Cottenham Park, Wimbledon, S.W. 19. *l.*
- 1911 MORICE, The Rev. F. D., M.A., F.E.S., Brunswick, Mt. Hermon, Woking. (*Life Member.*) *h.*
- 1912 NEAVE, B. W., Lyndhurst, 95, Queen's Road, Brownswood Park, N. 4. *l.*
- 1906 NEWMAN, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l.*
- 1911 PAGE, H. E., F.E.S., Bertrose, Gellatly Road, New Cross, S.E. 15. *l.*
- 1915 PEARSON, G. B., 5, Upper Bedford Place, Russell Square, W.C. 1. *l.*
- 1908 PENNINGTON, F., Oxford Mansions, Oxford Circus, W. 1. *l.*
- 1880 PERKINS, V. R., F.E.S., Wotton-under-Edge, Gloucestershire.
l, h, d.
- 1911 PESKETT, G. E. H., Ilanberis, 37, Woodbury Grove, Finsbury Park, N. 4. *l.*
- 1887 PORRITT, G. T., F.L.S., F.E.S., Elm Lea, Dalton, Huddersfield. *l, n.*
- 1912 POULTON, PROF. E. B., D.Sc., M.A., F.R.S., F.L.S., F.E.S., Wykeham House, Oxford. (*Hon. Member.*)
- 1897 PREST, E. E. B., Corrie, Ashted, Surrey. *l.*
- 1903 PRISKE, R. A. R., F.E.S., 9, Melbourne Avenue, W. Ealing, W. 5. *l, m.*
- 1911 QUARRINGTON, A., 14, The Broadway, West Norwood, S.E. 27. *l.*
- 1902 RAYWARD, A. L., F.E.S., Rockford, Beechwood Road, Sandhurst, Surrey. *l.*
- 1887 RICE, D. J., 8, Grove Mansions, North Side, Clapham Common, S.W. 4. *orn.*
- 1902 RILEY, N. D., 94, Drakefield Road, Upper Tooting, S.W. 17. *l.*
- 1910 ROBERTSON, G. S., M.D., St. Anne's, 101, Thurlow Park Road, Dulwich, S.E. 21. *l.*

YEAR OF
ELECTION.

- 1887 ROBINSON, A., B.A., 5, King's Bench Walk, Temple, E.C. 4. *l*.
 1894 ROBINSON, LEIGH, F.Z.S., 4, Queen's Walk, Ealing, W. 5. *l*.
 1911 ROBINSON, Lady MAUD, F.E.S., Worksop Manor, Notts. *l, n*.
 1887 ROUTLEDGE, G. B., F.E.S., Tarn Lodge, Heads Nook, Carlisle.
 l, c.
 1900 ROWDEN, A. O., 3, Archibald Road, Exeter. *l, b*.
 1904 ROWLAND-BROWN, H., F.E.S., Oxhey Grove, Harrow Weald. *l*.
 1890 ROWNTREE, J. H., Scalby Nabo, Scarborough, Yorks. *l*.
 1898 RUSSELL, A., F.E.S., Wilverley, Dale Road, Purley. *l*.
 1915 RUSSELL, S. G. C., Monkswood, Heathside Park Road,
 Woking. *l*.
 1908 STAUBYN, J. S., Tregothnan, Endlesham Road, Balham,
 S.W. 12. *l*.
 1914 SCHMASSMANN, W., Beulah Lodge, London Road, Enfield, N. *l*.
 1910 SCORER, A. G., F.E.S., Hillcrest, Chilworth, Guildford. *l*.
 1911 SENNETT, N.S., F.E.S., 32, Bolton Gardens, S. Kensington,
 S.W. 7. *c*.
 1910 SHELDON, W. G., F.E.S., Youlgreave, South Croydon. *l*.
 1898 SICH, ALF., F.E.S., Corney House, Chiswick, W. 4. *l*.
 1903 SMALLMAN, R. S., F.E.S., Eliot Lodge, Albemarle Road,
 Beckenham, Kent. *l*.
 1908 SMITH, B. H., B.A., F.E.S., Edgehill, Warlingham, Surrey. *l*.
 1890 SMITH, WILLIAM, 13, St. Mirren Street, Paisley. *l*.
 1882 SOUTH, R., F.E.S., 4, Mapesbury Court, Shoot-up-Hill,
 Brondesbury, N.W. 2. *l*.
 1908 SPERRING, C. W., 8, Eastcombe Avenue, Charlton. *l*.
 1873 STANDEN, R., F.L.S., F.E.S., Newlyn, Romsey, Hants.
 (*Life member.*) *l, b*.
 1872 STEP, E., F.L.S. Oakwood House, Barnett Wood Lane,
 Ashted, Surrey. *b, m, cr.: Insects, all Orders*.
 1916 STEWART, H. M., M.A., M.D., 123, Thurlow Park Road,
 Dulwich, S.W. 21. *l*.
 1909 STONE, F. J.,
 1910 STONEHAM, Lieut. H. F., F.E.S., Stoneleigh, Reigate. *orn, l*.
 1913 STOREY, GILBERT, Dept. of Agriculture, Cairo, Egypt. *Econ*.
 Ent.
 1911 STOWELL, E. A. C., B.A. (Oxon.), Laleham, Bexhill. *l*.
 1911 SWEETING, H. R., M.A., Wilfruna, Alexandra Grove, Finchley,
 N.W. 3. *l*.

YEAR OF
ELECTION.

- 1916 SYMS, E. E., 22, Woodlands Avenue, Wanstead, N.E. *l*.
- 1894 TARBAT, Rev. J. E., M.A., Fareham, Hants. *l, ool*.
- 1913 TACHEL, L., 23, The Arcade, Bournemouth. *l*.
- 1910 TAUTZ, P. H., Cranleigh, Nower Hill, Pinner. *l*.
- 1911 TODD, R. G., The Limes, Hadley Green, Barnet. *l*.
- 1902 TONGE, A. E., F.E.S., Aincroft, Grammar School Hill, Reigate. *l*.
- 1887 TURNER, H. J., F.E.S., *President*, 98, Drakefell Road, New Cross, S.E. 14. *l, c, n, he, b*.
- 1889 VINE, A. C., 45, Temple Street, Brighton, Sussex. *l*.
- 1889 WAINWRIGHT, C. J., F.E.S., 45, Handsworth Wood Road, Handsworth, Staffs. *l, d*.
- 1911 WAKELY, L. D., 34, Lancaster Road, Wimbledon Common, S.W. 19. *l*.
- 1880 WALKER, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c*.
- 1886 WALSINGHAM, The Right Hon. Lord, M.A., LL.D., F.R.S., F.L.S., F.Z.S., F.E.S., &c. (*Hon. member.*) *l, orn*.
- 1888 WEBB, S., Sussex House, Shepherds Well, Dover. *l*.
- 1911 WELLS, H. O., Inchiquin, Lynwood Avenue, Epsom. *l*.
- 1872 WEST, W., *Hon. Curator*, 8, Morden Hill, Lewisham Road, S.E. 13. *l, c, he*.
- 1878 WEST, W., L.D.S., Glyn, Sherwood Park Road, Sutton, Surrey. *l, mi*.
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.E.S., 37, Gloucester Place, W. 1. *l*.
- 1887 WHIFFEN, W. H., Holmwood Lodge, Laton Rd., Hastings. *l*.
- 1914 WILLIAMS, B. S., 77, Durham Road, E. Finchley, N. 7. *l*.
- 1912 WILLIAMS, C. B., B.A., F.E.S., Department of Agriculture, Trinidad. *l*.
- 1905 WINKWORTH, J. T., 290, Burdett Road, E. 14. *l*.

Members will greatly oblige by informing the Hon. Sec. of any errors in additions to, or alterations required in the above Addresses and descriptions.

REPORT OF THE COUNCIL, 1916.

THE Council of the South London Entomological and Natural History Society, in presenting the forty-fifth Annual Report, is able to state that the Society continues in a satisfactory condition.

Possibly owing to the present circumstances only two new members have been elected, and one old member, who resigned some years ago, has rejoined.

The Society has to deplore the loss of five members by death, *viz.*, J. Platt Barrett, C. A. Briggs, F. Enock, H. W. Martin and H. A. Sauzé, and three have resigned.

The Membership at present stands as follows: 3 Hon. Members, 7 Life Members, 131 Ordinary Members and 22 Country Members, —total 163.

During the year several of our active members have undertaken military duties, this and the darkness of the streets has somewhat interfered with the attendance at the meetings, nevertheless a good average has been maintained.

The Council would like to place on record their great appreciation of Mr. Step's hearty co-operation in all that has been brought forward for the advancement of the objects of the Society for many years past, and trust that in the near future circumstances will again permit him to continue his useful work amongst them.

The Balance Sheet, duly audited, is printed on pages xiv-xv.

The Special Exhibition of "Orders other than Lepidoptera," was held on May 11th, when there were numerous exhibits of great interest.

The Annual Special Exhibition of Varieties and other objects of special interest was held on December 14th. Although the attendance was smaller than in previous years, yet the exhibits, especially those of Lepidoptera, were of more than usual interest.

Mr. Dennis has again kindly filled the office of Lanternist.

Mr. D. R. Morford continues as Recorder of Attendances.

The following is a list of Papers read before the Society:—

February 10th.—“*Ocneria dispar* in Britain,” by R. ADKIN, F.E.S.

April 13th.—“The Flight of Birds,” by F. W. FROHAWK, M.B.O.U., F.E.S.

May 25th.—“On the Genus *Catocala*,” by the PRESIDENT.

September 14th.—“On *Pararge aegeria*,” one by the PRESIDENT and one by Mr. A. E. GIBBS.

October 12th.—“On *Pararge aegeria* var. *egerides* from Devon,” by Mr. A. E. GIBBS.

October 26th.—“The Genus *Pararge*,” by the PRESIDENT.

November 9th.—A Lecture by Professor BATESON, F.R.S., “Remarks on the Mendelian Theories, with especial reference to their recent application in experiments made in America.”

January 11th.—“On Rearing Beetles of the Genus *Geotrupes*,” by HUGH MAIN, B.Sc., F.E.S.

The Honorary Curator, Mr. W. West (Greenwich) reports the following additions to the Cabinets:—

Mr. Leeds, four examples of *Strymon pruni*.

Mr. Piske, a pair of *Copris lunaris*.

Mr. Ashdown, a pair of *Cryptocephalus coryli*.

Mr. Routledge, a pair of *Melasoma wneum*, also a pair of *Ancistronychia abdominalis*.

Mr. Bunnett, a pair of *Mycetophagus populi*.

Dr. Chapman, several species of Orthoptera.

Mr. Ashby, several species of Coleoptera, and from the Curator himself numerous species of Coleoptera, Hemiptera and Orthoptera.

The Honorary Librarian, Mr. A. W. Dods, reports that the Library has been well used for reference on the meeting nights, and the sales of “Proceedings” show a large increase on previous years.

There have been seven Field Meetings during the year:—

April 8th.—To COBHAM and OXSHOTT, conducted by Mr. W. J. KAYE.

May 20th.—To WISLEY, conducted by Mr. W. J. KAYE.

June 24th.—To CLANDON, conducted by the PRESIDENT.

July 22nd.—To BOXHILL, conducted by the PRESIDENT.

August 12th.—To ROYSTON, HERTS, conducted by Mr. A. E. GIBBS.

September 9th.—To WESTERHAM, conducted by the PRESIDENT in the absence of Mr. R. Adkin.

October 7th.—Fungus Foray to OXSHOTT, conducted by Mr. W. J. LUCAS.

Reports of these meetings, furnished by the respective conductors, will be found in the "Proceedings."

Messrs. S. Edwards and A. Sich were the Society's delegates to the Annual Congress of the South-Eastern Union of Scientific Societies held last May at Tunbridge Wells.

Prof. Bateson, F.R.S., was the Society's delegate to the Conference of the representatives of the Corresponding Societies of the British Association at Newcastle in September.

The Volume of "Proceedings" published during the past year consists of xvi. and 156 pages, with twelve plates, two of which are coloured.

The following is a list of the additions to the Library:—

Books.

"Biographical Index of Fossils in the United States Museum."

"Synopsis of the Genus *Polyporus*," Cincinnati.

"Natural History of Bournemouth."

"United States Museum Bulletin, Birds."

"Catalogue of the Meteoric Collection," United States National Museum.

"Osteological Material," Connecticut Academy,

"Sessile Barnacles," United States National Museum.

Magazines and Periodicals.

"Irish Naturalist."

- "Entomologist's Monthly Magazine."
- "Entomological News."
- "Entomologist."
- "Canadian Entomologist."
- "Bulletin of the Soc. Ent. France."
- "Entomologist's Record and Journal of Variation."
- "Phillipine Journal of Science."

Reports and Transactions of Societies.

- "South-Eastern Naturalist," 1915-16.
- "Report of the Meeting of the Corresponding Societies of the British Association."
- "Smithsonian Annual Report," 1915.
- "Proceedings of the Smithsonian Institute," 1915.
- "Annual Association of Naturalists of Lavallois-Perriat, 1913."
- "British Association," 1915.
- "Torquay Nat. Hist. Society."
- "Hastings and St. Leonards Nat. Hist. Society."
- "Proceedings of the Bournemouth Science Society," Vols. I.-VII.
- "Croydon Nat. Hist. and Scientific Society."
- "Reports of the United States National Museum."
- "Proceedings of the United States Museum," 1915.
- "Lancashire and Cheshire Nat. Hist. Society," 1914-15.
- "London Nat. Hist. Society," 1915.
- "Bulletins of the Agricultural College of Portici," Naples.
- "Entomological Society of Ontario."
- "Annual Report of the Chicago Nat. Hist. Museum."
- "Transactions of the Wisconsin Academy."
- Two parts of the "Transactions of the Entomological Society of London," from Mr. Lachlan Gibb.

Pamphlets and Separata.

- "Alternation of Generation," by Janet.
- "Egg of *Dolosa globator*," by Janet.
- Three separata from Stockholm.
- "Fungi of Dorset," 2 pts. and 1 sup., from Rev. E. L. Linton.
- "Revision of the genus *Inja*, U.S. Museum" (bot.).

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. STATEMENT OF ACCOUNTS FOR THE YEAR 1916.

xiv

REVENUE ACCOUNT.

<i>Expenditure.</i>	£ s. d.	<i>Income.</i>	£ s. d.
To Debit balance from 1915 ..	.. 16 7 3	By Subscriptions, 78 at 10/- ..	.. 39 0 0
" One Year's rent ..	.. 25 0 0	" " 12 " 7/6 ..	.. 4 10 0
" Insurance ..	.. 1 4 0	" " 1 " 6/- ..	.. 0 6 0
" Attendance one year ..	.. 2 10 0	" " 2 " 5/- ..	.. 0 10 0
" Subscription to South-Eastern Union ..	.. 0 10 0	" " 8 " 2/6 ..	.. 1 0 0
" Postages, Stationery and Sundries:—		" " paid in advance ..	.. 5 10 0
S. Edwards ..	5 10 0	" Arrears of Subscriptions received ..	.. 9 5 0
H. J. Turner ..	12 6	" Entrance fees, 3 at 2/6 ..	.. 0 7 6
T. W. Hall ..	1 15 4	" Debit Balance ..	.. 29 8 1
Entrance fees carried to Suspense Account ..	7 17 10		
" Vote to Publication Fund ..	0 7 6		
" Vote to Library Fund ..	35 0 0		
"	1 0 0		
	<u>£89 16 7</u>		<u>£89 16 7</u>

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT. (Held in Suspense.)

	£ s. d.		£ s. d.
To Balance ..	.. 49 12 0	By Balance from 1915 ..	.. 49 4 6
		" Entrance fees, 1916 ..	.. 0 7 6
	<u>£49 12 0</u>		<u>£49 12 0</u>

LIBRARY FUND.

[illegible]

PUBLICATION FUND.

	£	s.	d.
To Debit Balance (1915)	..	1	4 7
" Archer's Account printing "Transactions"	..	46	5 6
" Gibbs and Bamforth—printing plates	..	11	17 0
" Credit balance	..	3	7 3
			£62 11 4
By Sale of "Proceedings"	..		
" Donations	..		
" Vote from General Fund	..		
			£ 5 12 4
	..	22	2 0
	..	35	0 0
			£62 14 4

BALANCE SHEET.

<i>Liabilities.</i>	£ s. d.	<i>Assets.</i>	£ s. d.
To Debit Balance Revenue Account	29 8 1	By amount to Credit of Suspense Account ..	49 12 0
„ „ Library Fund	0 4 7	„ „ „ „ Publication Fund	3 7 3
„ „ Balance being excess of Assets over Liabilities ..	28 6 7	„ „ „ „ Amount of subscriptions in arrear, £23 ls. 0d., valued at	5 0 0
	£57 19 3		£57 19 3

T. W. HALL,
Hon. Treas.

Audited and found correct, *January 13th, 1917.*

F. B. CARR,
S. EDWARDS,

Ocneria dispar in Britain.

By ROBERT ADKIN, F.E.S.—*Read February 10th, 1916.*

Probably the occurrence of *Ocneria dispar* in this country and its subsequent more or less complete disappearance, have given rise to more controversy than similar phenomena in regard to any other species that we are pleased to call British. I suppose that the present day lepidopterist, if he troubles his head about the matter at all, is content to assume that the species was common in "the fens" up to about the middle of the last century, when it, like another fen loving species and namesake, *Chrysophanus dispar*, suddenly disappeared. So far so good, but is that all?

So far as I have been able to trace, our oldest writers were not acquainted with the species. Moufet's "*Insectorum Theatrum*," 1634; Ray's "*Historia Insectorum*," 1710; and Petiver's "*Opera Historiam Naturalem Spectantia*," 1764, are all difficult to follow, but so far as I have been able to follow them, no mention of any species that will pass for *O. dispar* is included in them, neither does Stephens in his Catalogue refer to any of these authors under this species. I ought perhaps to say that Haworth in his "*Lepidoptera Britannica*," among a long list of references to various authors, chiefly continental, quotes Albin's "*Natural History of English Insects*," 1720, plate 93. Fortunately Albin, on practically all his plates, figured both larva and imago. On plate 93 is depicted an undoubted Geometrid larva and an equally unmistakable Geometrid imago, which he tells us the larva produced; these figures cannot therefore be intended for *O. dispar*—no names are given throughout the work—nor is there any figure on any of his "One hundred plates" that can be taken to represent that insect; neither does Moses Harris, who by the way does give English names to all his insects and Latin names also to many of them, make any mention of the "Gipsy Moth" in the "*Aurelian*" published in 1766. All these old writers appear to have been ardent collectors, and I think we may fairly assume that they had not recognised *O. dispar* as a British species.

The first mention I find of the species is in Benjamin Wilkes' "*Natural History of the Moths and Butterflies*," published in 1773, I believe, so far as regards letterpress, but the plates appear to have been published somewhat earlier; at any rate he figures the insect in all its stages and tells us that a Mr. Peter Collinson received a nest of eggs from Germany, gave them to one Charles Lockyer, Esq.,

who bred moths from them and "turned numbers of them wild about Ealing, near Brentford, in Middlesex," where they were to be found but not anywhere else that he had heard of. In passing I may mention that Wilkes refers copiously to the older authors, often quoting among many others the three that I have already mentioned, but he does not refer to them in regard to *O. dispar*, which I think may be taken as further evidence that it was not known as British in their day.

In this connection an entry in an old diary, for a note of which I am indebted to Mr. Frohawk, is of interest. The diary was written by a William Jones, of Chelsea, and is in the possession of Dr. F. Dawtry Drewitt, of Kensington, and in it there is this entry "15 July, 1764, Bred 3 female Gipsy Moths and 1 male." Dr. Drewitt has also very kindly furnished the following information. "In the diary of the 'Society of the Entomologists of London,' of which Wm. Jones was the moving spirit, and who recorded butterflies and moths captured or bred between May, 1780, and August, 1782, there is no mention of the Gipsy Moth. In Jones' own list of 130 moths, with dates of their appearance, etc., it is not mentioned, but in his later list of 310 moths the Gipsy is included on the authority of Harris. Among the insects in the Jones' cabinet there is no specimen of *O. dispar* with an eighteenth century pin, as there is of *Psilura monacha* and others near it." The inference, therefore, appears to be that Jones' specimens, like those mentioned by Wilkes, were bred from continental ova, had they been of British origin he would surely have mentioned them in some of the numerous lists that he compiled, and have kept the specimens in his collection.

Well, Wilkes having set the ball rolling, others were eager to take it up, and so Moses Harris, in "The English Lepidoptera or the Aurelian's Pocket Companion," 1775, a tabulated list of names, times of appearance, etc., gives the "Gipsy" and adds Linnaeus's name "*Dispar*." Berkenhout, "A Synopsis of the Natural History of Great Britain and Ireland," 1795, mentions it as frequent about Ealing, in Middlesex; and Donovan, "The Natural History of British Insects," 1796, says that it cannot have been "uncommonly scarce about fifteen years ago," as almost every collector has a specimen in his collection, but they may have been bred from ova, and that Harris did so breed it in 1775, but that it never was "*frequent* about Ealing"; and that being unable to obtain British examples to figure he had to rely upon German, "which exactly agree with those found in England." Haworth, "Lepidoptera Britannica," 1803, mentions *dispar* as "with us very rare."

This appears to close the first phase in its British history, for nothing seems to have been heard of it for some years subsequently. Whether Wilkes's circumstantial account of its artificial introduction in the neighbourhood of Ealing be correct or not, the collectors of about 1773 and the few following years appear to have obtained specimens which they accepted as British, but those of a few years

later were unable to find the species in that neighbourhood; if the species ever did breed there it had disappeared, the chroniclers of the later years of that century apparently having founded their assertions not on their own observations, but on the records of those of the seventeen-seventies.

At just what date it was rediscovered is open to some doubt, but I am inclined to think it must have been somewhere about 1820, and what appears to be the first record we have of it is by John Curtis, who, writing of the species, says: "It is not easy to conceive the delight I experienced when a boy on finding the locality of the Gipsy moth; after a long walk I arrived at the extensive marshes of Horning, in Norfolk, having no other guide to the spot than the *Myrica gale*, and on finding the beds of that shrub, which grows freely there, the gaily coloured caterpillars first caught my sight; they were in every stage of growth, some of them being as large as a swan's quill; I also soon discovered the moths, which are so totally different in colours as to make a tyro doubt their being legitimate partners; the large loose cocoons were likewise very visible, and on diligent search I also found bundles of eggs." I have quoted Curtis somewhat fully as his account of his finding the species gives a better idea of its abundance than would be conveyed by any words of my own.

In or about the year 1830 the Rev. Jenkins found the moth very plentifully in the fens about Whittlesea Mere, but Henry Doubleday was unable to find it there in 1836, he, however, found the larvæ swarming at Yaxley Fen in 1839, and it was still common there in 1846. In 1845 Frederick Bond found it abundantly at Holme and Ramsey Fens, and at about the same time the Rev. Jenyns met with it at Burwell Fen. These are the latest definite records of which I am aware and it appears to be fairly certain that it disappeared entirely from the fen lands about 1850, and thus closes the second phase in its British history. But it will be noted that in those days it was distributed abundantly over a wide district, far more so than one would imagine could be the case as a result of any artificial introduction.

For some years after this period *O. dispar* appears to have been absent as a wild species, but numbers were being bred in confinement, and are so even to the present day, in the fond belief that they are the descendants of those old "fen" insects, a belief in which to say the least of it, there is reason for very considerable doubt. It is also a point for consideration whether the large numbers that are known to have been reared artificially, have or have not any bearing upon the records of wild captures that have been from time to time recorded of more recent years, of which the following may serve as examples. In 1870 our late member, Major Ficklin, captured a female at rest on a tree trunk in the New Forest; and a Mr. W. Holland, a male flying in a wood near Odiham, Hants. In 1872, Dr. F. D. Wheeler found the larvæ on hawthorn at Monks

Wood, Hants; the Rev. G. H. Raynor, one at Cherry-Hinton, Cambs., in 1875; and in 1885 a few more were recorded as having been taken on hawthorn, in Warwickshire. Mr. J. F. Green records that on the night of August 3rd, 1899, a male flew to light in a bed-room in a house that he had at Sandgate; and Mr. S. G. Hills, that he reared a fine male from a larva inadvertently brought in on some hawthorn gathered in the Warren at Folkestone, in the same year. Mr. B. W. Adkin has a series received from a correspondent at Malvern, Worcestershire, who says he bred them from wild larvæ taken on the hedges of the neighbourhood in 1907, but that he has not come across any larvæ since then.

But the most interesting and circumstantial account of any recent captures is that given me by Mr. H. A. Leeds, who informs me that one evening early in August, 1907, when collecting in Huntingdonshire, he noticed, while it was still daylight, a female *O. dispar* clinging to a twig of a blackthorn hedge. The moth was boxed and on the box being examined on the following morning it was found that a number of ova had been deposited, from which a small brood was ultimately reared. He further informs me that in previous years he had taken some three or four male imagines in the same locality. The lane where these moths were taken is some four miles or so from the celebrated "Monk's Wood," and is bordered on the one hand by old timbered wood-lands and on the other by hedges dividing it from rough fields and pasture lands, and although the district cannot be said to be in the fens it is only about a mile from them and on a somewhat higher level, but it is not infrequently under water, especially in winter. The older records of the species pretty generally give fen-country as its habitat, and from the description of Mr. Leed's locality one would imagine that it might be a likely one to find it in, but unfortunately he has only once since 1907 been able to make a further and then unsuccessful search.

Then there is the female that I found at rest on the trunk of an elm tree at Eastbourne, on the 30th August, 1909. It was an unusually large specimen, and although in fairly good condition externally and apparently full of eggs, it seemed to be so utterly worn out that my most careful attentions for several days failed to induce it to part with them.

On the continent of Europe *O. dispar* is pretty generally distributed and is, as a rule, a common species. In America, where it was accidentally introduced, it has become disastrously abundant in many districts; in fact its geographical range extends over practically the whole of the Palaearctic region, and the species appears to have the power of becoming locally very abundant, for, it may be, a short or more extended period without, so far as we know, any particular reason, but no doubt in response to some special conditions that are beyond our present knowledge. So far as concerns Britain, the question whether this or that particular specimen or

group of specimens that we may have in our collections are genuine natives or not, unless they show some marked peculiarity, is matter of little scientific importance; the point that is of importance is, are we right in including Great Britain as within the natural geographical range of the species?

In a very serviceable little book published in 1896, on the cover of which we find the legend "The Common Moths of England," but which is probably better known to you by its title page inscription "British Moths," by J. W. Tutt, F.E.S., we read at page 87 "THE GIPSY MOTH (*Oenaria dispar*).—This species has no place whatever in our indigenous British fauna." Is this really so? So long as I can remember, and I doubt not for many years before I was born, *Oenaria dispar*, as a British insect, has been looked upon with a certain amount of suspicion. Probably this was engendered by Wilkes' circumstantial account of its attempted introduction by artificial means, but according to his own showing the attempt failed within a very short space of time, apparently a matter of a couple of years or so. It is also well known that many attempts have been made within recent years to re-establish the species by turning out large numbers of ova, larvæ and pupæ in various parts of the country, and it is by no means improbable that some of the records of recent captures may have resulted from such attempts, but so far as we know all such attempts have ended in almost immediate failure. Does it then seem reasonable to suppose that any artificial introduction would result in the abundance of the species, that there undoubtedly was, in the fen districts for many years? Is it not far more probable that the species established itself there under natural conditions and prospered, until some untoward circumstance occurred which rendered its further existence there impossible? What the particular circumstance that caused its extinction may have been we know not, but it is significant that this species and another—*Chrysophanus dispar*—disappeared from the fen districts, so far as can be gathered from known records, within a year or two of one another, leaving us to deplore them as lost, but none the less, British species.

An interesting discussion followed, in the course of which Mr. C. B. Williams said that in America, where the species was always more or less common and had at times become a serious fruit-tree pest, its economy had been carefully studied for many years. It was noted that at one time a restricted area would be devastated by it while the surrounding country was comparatively free from its attacks, and it would then appear in profusion in some other district. This led to very careful investigation, in the course of which it was definitely proved that the young larvæ were carried on the wind; in one notable case it was shown that vast numbers of young larvæ were thus transported from one place where they were abundant to another previously free from them, eleven miles distant across an

arm of the sea. Mr. H. J. Turner referred to the tendency of the species to develope deformities when inbred in confinement for several generations; and Mr. F. W. Frohawk considered that the wild British fen insects differed from others in the shape of their wings. Messrs Sich, Curwen and others also took part in the discussion.

The Genus *Pararge*.

By HY. J. TURNER, F.E.S.—Read October 26th, 1916.

In Britain we have been accustomed to allocate the two species *aegeria* and *megea** to the genus *Pararge*, and those of us who are interested in the continental Lepidoptera also include *maera*, *hiera*, *achine* and other less common species.

A quite casual glance at our two British species will suffice to suggest to us that the differences are weighty enough to place them in separate genera or at least in sub-genera.

This was the opinion of the great Hübner a century ago when he was preparing his List, the "Verzeichniss," 1816-1827.

POSITION OF THE PARARGE SPECIES PREVIOUS TO THE "VERZ." OF HÜBNER, 1818.

Linnæus in 1758, "Sys. Nat.," ed. x, p. 472, etc., included *aegeria* in his section "gemmati" of the division "Nymphales" of *Papilio*. In 1767, *l.c.*, ed. xii., *megea* was added to this section which was distinguished from the "Heliconii" and "Danai" by the edges of their wings which are indented or scalloped in the "Nymphales," and adorned with eyes which are found on all the wings in some species and in others only on the hindwings, in the "Nymphales gemmati." Thus we get a collection including such diverse species as *io*, *aegeria*, and *iris*.

In 1767, Moses Harris issued an "Essay," to precede a supplement to his "Aurelian," 1766, in which appears a systematic arrangement of the British butterflies based on the wing-veins. All the species we now recognise as Satyrids were included in the genus *Argus*. This name as a genus name has been, and may well be, discarded, for it has been used in a most irregular way for various groups at different times, even being employed to contain sections of the *Lycaenidae*. [See Scudder, "Hist. Sketch," p. 118 (1875).]

In 1776 (1775)†, Schiffermüller brought out his wonderful "Verz.," known as the "Vienna List," (or W.V.), in which he ably collated all that was known of the larval stages of the Lepidoptera, into a marvellously correct (as we now consider) natural arrangement for the time. In the section F., p. 165, "Larvæ subfurcatæ" of the "Day-lepidoptera," he placed all the then known European Satyrids,

* This is the original spelling of Linnæus.

† Mr. Durrant tells me that early copies have 1775 on the title page.

those species whose larvæ were unknown being placed close to the species to which in the imaginal stage they appeared to him to be related, *e.g.*, *megea* next to *aegeria*. "Two-horned larvæ, margin-eyed butterflies."

Scopoli, in 1777, "Introd. Hist. Nat.," placed all the Satyrids and many other species such as *apollo*, *iris*, etc., in a genus *Argus*, which he diagnosed as having wings somewhere ocellated, not tailed, nor ornamented. This he subdivided into (a) eyed, *hyperantus*, etc., (b) eyed and banded, *megea*, etc., (c) eyed and blotched, *aegeria*, etc., (d) eyed and spotted, *io*. Quite an unnatural classification, but at the same time he perceived that the *aegeria* group of species was separable from the *megea* group.

Borkhausen, 1788, "Nat. eur. Schm.," placed the Satyrids in the 4th Family "Oreaden (Oreades)" of his 1st Horde "Nymphalen (Nymphæ)," but did not further subdivide it.

Fabricius, in 1793, "Ent. Sys.," vol. iii., placed all the Satyrids (119) in the genus *Hipparchia* which he described as follows in 1807 ("Illiger. Mag.," vol. vi.):—

"Palpi 2, long, fine, compressed, longer fringed towards the outside, 3-jointed, 3rd joint short, bent inwards, pointed, turned back below the apex. Antennæ thicker towards the extremity, rather pointed."

In 1801, Schrank in "Fn. Boica.," vol. ii., (1), established the genus *Maniola* for all the species we now term Satyrids. This he divided into sections without names, *galathea*, *aegeria*, *megea*, *maera*, *dejanira* (*achine*), etc., being in the first section.

Schrank diagnosed his genus *Maniola* as follows:—

"Antennæ filiform, clubbed at the end, the clubs cylinder shaped, slender. Feet six, the first pair extremely short, hidden under the breast hairs, clawless, tufted. Wings at rest entirely erect.

A. Wings mostly brownish; some ocelli at the hind margin.

Larvæ tapering backwards, the anal extremity with small double points.

The head almost round. Transformation in the air in a front 2-pointed pupa, which hangs merely by the hinder end point.

* Wings many eyed, short toothed.

** Wings many eyed, smooth edged.

*** Wings toothed with a few small ocelli."

This includes the whole of what are known as Satyrids. (The division B. includes *iris*, etc.).

In 1805 Latreille, "Hist. Nat. Crust. et Ins.," vol. xiii., placed our Satyrids in the *Satyri* section of *Nymphalis*.

In 1809 Latreille, "Gen. Crust. et Ins.," vol. iv., p. 194, continued the use of *Nymphalis* with *Satyri* as the group name.

In 1810 Latreille, "Considerations gen.," pp. 355 and 440, separated *Satyrus* from *Nymphalis*, and included a heterogeneous set of species.

Leach, in 1815, "Edin. Ency.," vol. ix., adopted the genus *Hipparchia* for the whole of the Satyrid species.

Ochsenheimer, in 1816, "Schm. Eur.," vol. iv., adopted *Hipparchia* for the Satyrids, which he divided into seven sections without diagnoses, of which section C contains our species and *hyperantus*, etc.

Dalman, in 1816, "För. sys. Upps. Sver. Fjar.," produced a systemic arrangement of the butterflies, placing all our Satyrids in the genus *Erebia*, diagnosing it as in the family "Papiliones," the section and phalanx "Tetrapodes," and division II characterised by "Alae posteriores areola clausa, nervos radiatim emittente. Larva nuda, ano bimucronato." A still further subdivision is indicated for *aegeia*, *maera* and *megea* by the character "oculis hirtis," hairy eyes.

ORIGINAL DESCRIPTION AND DIFFERENTIATION.

It was in the year 1818 that the genus (Coitus) *Pararge* was founded by Hübner, "Verz.," p. 59, and it contained (*a*) *aegeia* and *cynthia* (with *meone*). The genus (Coitus) *Dira* was at the same time founded to contain *rorelana*, *megea*, *maera* and *clytus*.

The former genus, *Pararge*, is described as follows:—The wings pale spotted above, the forewing marked with one distinct eye-spot, the hindwing with several indistinct ones.

The latter genus, *Dira*, is described as follows:—The wings are spotted orange above, below marked with white wavy lines and finely ringed eye-spots.

These two genera, *Pararge* and *Dira*, were both in Hübner's family *Marmoratae*, described as having both wings eyed and marbled, but the forewing less so than the hindwing.

This family, *Marmoratae*, was the fifth family of the Stirps IX, which Hübner called *Oreades*, and to which he referred as equal to the *Gemmati* of Linnæus and to the *Satyri* of Fabricius.

This last reference I have, so far, been unable to trace. Latreille, in 1805, uses this name *Satyri* for the section of his *Nymphalis*, which contains the species we now are accustomed to call Satyrids.

Thus we see that Hübner, whose judgment is rarely in error, considered the two species, which happen to be indigenous in Britain, as sufficiently distinct to merit a generic separation.

Hübner placed the species *achine* (*dejanira*) in the 7th genus (Coitus) of the same family, *Marmoratae*, which he called *Enodia*. With *achine* were associated *hyperantus* (now separated in the genus *Aphantopus*) and *andromacha* (now *portlandia* and taken as the type of *Enodia*). *Achine* alone remaining was therefore placed by Moore in a new genus, *Crebreta*.

It must be noted that Hübner used the genus-name *Hipparchia*, Fab., and the name *Maniola*, Schrnk., for quite different species, and omitted the genus-name *Satyrus*, Latr., altogether without reference, as he also did the name *Erebia*, Dalm.

THE HISTORY OF THE GENUS *PARARGE* AND ITS SPECIES SUBSEQUENT
TO THE "VERZ." OF HÜBNER.

In 1819, Latreille, "Ency. Meth.," vol. ix., divided the genus *Satyrus* into sections unnamed, in the fourth of which we find *megea*, *aegeia*, *galathea*, *semele*, *arctiops*, etc., in fact all our British Satyrids.

Stephens, in 1827, "Ill. Brit. Ent.," vol. i., p. 53, included the whole of the 20 British, actual and reputed, species of *Satyridae* in the comprehensive genus *Hipparchia*, at the same time stating that it was a "most heterogeneous assemblage." He subdivided the genus into sections and subsections. In the section with "Eyes pubescent," he placed *aegeia*, *megea* and *marra*. (This last was then held to be a British species, but very rare.)

In 1828, Curtis, "Brit. Ent.," fol. 205, put the whole of the British *Satyridae* in the genus *Hipparchia*, but separated *megea* and *aegeia* as a section characterised by pubescent eyes.

Meigen, in 1829, "Sys. Bearb. Eur. Schin.," after placing all the *galathea* species in *Melanargia*, adopted *Maniola*, Schrank, for the remainder of the Satyrids.

Boisduval, in 1829, "Index Meth.," placed the whole of the Satyrids in the genus *Satyrus*.

In 1829, "Icones," Boisduval divided up his tribe *Satyrines* into *Argo*, *Erebia*, *Chionobas* and *Satyrus*. *Aegeia* and *megea* are in the last.

Herrich-Schaeffer, in 1835, "Nomenclator Ent.," used *Hipparchia* for all the European Satyrids.

In 1840, Westwood, "Brit. Butt.," p. 15, placed both *aegeia* and *megea* in a genus which he named *Lasiommata*. In thus picking out *megea* from the genus *Dira* of Hübner, Westwood came in as a first reviser, leaving *rovelana* and the exotic species *clytus* in the genus *Dira*, while *megea* became the type of the genus *Lasiommata*. The following is the description of this genus:—

"This genus is at once distinguished from all the other *Hipparchiides* by having the eyes thickly clothed with hairs, in addition to which the palpi are very slender, moderately clothed to the tip beneath with long hairs, the terminal joint being very short; the wings, especially the posterior pair, are denticulated, and considerably varied, the forewings with one, and the hind ones with five or six eyes; the antennæ are straight, distinctly annulated with black and white, and with the club pyriform; the mediastinal and median veins are more or less swollen at the base, the anal one being simple. The fore legs, although considerably smaller than the intermediate ones, are yet very conspicuous: they are of equal length in both sexes, but those of the males are comparatively slender and more densely clothed with long slender hairs; the tarsal portion in the male is simple, but in the female it is broader and articulated with several short strong spines at the tips of the joints on the underside;

the larva of *L. megera* is elongated, villose, with two short points at the tail, and the pupa is short, thick, with small angular points, and two points at the head; it is suspended by the tail. The chrysalis of *L. maera*, according to M. Marloy, is suspended by the tail in the open air; it is naked and angular with two points on the head, and with broad brown bands on the wing-covers. This genus corresponds with the first section of *Hipparchia*, of Curtis and Stephens, and with Duponchel's fifth group, *Vicicoles*, the species being said to occur in the neighbourhood of habitations. Stephens more correctly states that they frequent woods, lanes, and highways. They form Hübner's two groups *Pararge* and *Dira*."

In 1840, Boisduval brought out another "Ind. Meth.," in which he much subdivided the genus *Satyrus*, including under "*oculi birti*," *clymene*, *roxelana*, *maera*, *hiera*, *megera*, *aegeria* (and var. *xiphia*), and *dejanira* (*achine*).

In 1843 Herrich-Schaeffer, "Sys. Bearb. Schm. Eur.," vol. i., spelled the genus *Pararga*, possibly copying Heydenreich, "Verz.," and included the same species.

Duponchel, in 1844, "Cat. Meth. Lep.," used *Satyrus* in the same sense as Boisduval, much dividing it into sections.

In 1850 Stephens, "Cat. Lep. B. M.," restricted his former extended use of *Hipparchia* for all the Satyrids to comprise only *semele*, *janira* and *tithonus*. He adopted the genus *Lasiommata* of Westwood for *aegeria* and *megera*.

In 1850 Doubleday, Westwood and Hewitson, "Gen. Diur. Lep.," vol. ii., p. 385, in a very elaborate way, redescribed the genus *Lasiommata* and made it very comprehensive, including the following somewhat heterogeneous mass of species: *clymene*, *roxelana*, *maera*, *hiera* (*lyssa*), *megera* (*tigelinus*), *aegeria*, *xiphia*, *dejanira* = *achine*, *eversmanni*, *schakra*, *cordace*, *satricus*, *montrollii*, *clerimon* (?), *zachaeus* (?), *merope*, *philerope*, *banksia*, *hobartia*, *achanta* (?), *singa* (?), *abrona* (?), *lathoniella* (?), and making it an omnibus genus to cover *Dira*, *Pararge*, *Epinephele* and *Enodia* of Hüb. Some of the above species were included doubtfully, and in fact the last thirteen have been since definitely and properly removed from *Lasiommata* in which they were certainly misplaced.

In 1852 Lederer, "Verh. zool.-bot. Ver. Wien.," used *Pararga* for *aegeria*, *megera*, etc., copying the spelling of Herrich-Schaeffer, etc.

In 1856 Herrich-Schäffer, "Sys. Bearb.," vol. i. and vi., p. 3 (Verz.), still spelt Hübner's genus as *Pararga*, and arranged the species thus:—

I. *dejanira* = *achine*.

II. 1. A. *clymene* (var. *roxandra*) and *roxelana*.

B. (a) (*tigelinus*), *maera* (var. *advasta*), and *megera*.

(b) *hiera*.

2. *aegeria*, *meone* and *xiphia*.

placing them in very natural subdivisions. He had dropped the

genus name *Hipparchia* of 1835 and put the European Satyrids into eight genera, of which *Pararge* is the seventh.

Rambur, in 1858, in his "Cat. Lep. And.," used *Pararge* for the same species.

Butler, in 1867, "Ann. and Mag. N.H.," (19), p. 161, described a genus *Ameceza* for *megeza*, etc., leaving *aegeria* in *Lasiommata*, Westw. At the same time he pointed out that the genus *Pararge* of Hüb. "possessed the advantage of priority." In this last statement he is quite correct, and *Lasiommata* cannot stand as the genus of *aegeria*, etc., but must be restricted to *megeza*, etc. Thus his genus *Ameceza* for the last species is redundant and must be used for some other species. At the same time Butler criticised Westwood's *Lasiommata* as including very widely distinct species, and pointed out the divergent general characteristics of *aegeria* and *megeza* as species of the same genus.

In 1868, Butler, "Cat. Diur. Lep. Saty.," made two genera of this group of species, putting in *Pararge*, *aegeria* with *tircis* and *meone*, *xiphia* (Fab.), *rovelana*, *climene*, *epimenides*, *schrenckii*, *maackii*, *ménétriésii*, *achine*, *deidamia* and *canthus*, and into his new genus *Ameceza* (1867), *megeza* with *lyssa*, *adrasta*, *paramegaera*, *xiphia* (Boisd.), *maera*, *maerula*, *menara*, *shakra*, *maderakal*, *hierra*, *eversmanni* and *baldira*.

Kirby, in 1871, "Syn. Cat.," p. 73, uses the name *Satyrus* for the species in *Pararge* and *Dira* of Hüb., the *Lasiommata* and *Ameceza* of Butl., including the species *aegeria*, *epimenides*, *dejanira* (*achine*), *deidamia*, *maackii*, *schrenckii*, *rovelana*, *clymene*, *eversmanni*, *maera*, *maerula*, *schakra*, *menara*, *maderakal*, *hierra*, *megeza* (*tigelinus*), *xiphia*, Bdv.

Apropos of the genus name *Satyrus*, the remarks of Scudder, 1875, "Hist. Sketch of Generic Names," p. 265, may well be referred to here. Since Latreille, 1805, *l.c.*, used *Satyrus* (le Satyre of old authors) as the name of the species now recognised as *maera*, and is also preoccupied in Mammals, and as *Satyra* in Diptera, "it must be dropped," being based upon a specific name. As this genus-name has been used in such a loose way, and for very different groups by different authors, it would seem better to avoid the use of it for the future, as Scudder proposed.

Dale, in 1890, "Hist. of our Brit. Butts.," adopts *Hipparchia* and selects subgenera *Lasiommata* for *aegeria* and *megeza*, *Hipparchia* for *senele*, *Satyrus* for *janira* and *tithonus*, and *Enodia* for *hyperantus*, omitting *Pararge* altogether. Apparently this is a random selection without any historical basis.

BRITISH OPINION AND PRACTICE OF THE LAST 20 YEARS.

In 1893, Barrett, "Lep. Brit. Is.," vol. 1., p. 227, included both *aegeria* and *megeza* in *Pararge*. He diagnosed it, "Antennæ moderately long with a narrow or somewhat spatulate club; head, palpi and eyes hairy; forewings rounded and having the sub-costal and

median nervures dilated near the base; hindwings slightly elongated, with faintly scalloped margins. Larvæ smooth and elongated, with two anal points. Pupæ stout, angulated, with two points to the head; suspended by the tail."

In 1896, Tutt, "Brit. Butt.," p. 375, etc., included the same two species. He diagnosed the genus, "Larva, with three subsegments to first thoracic segment, four to the second and third thoracic, and six to the abdominal segments. Pupa with two movable abdominal incisions." (Power of movement in the incisions between the 4-5 and 5-6 abdominal segments.) He laid stress upon the more generalised characters in both larvæ and pupæ of this genus among the Satyrids.

Meyrick "Hand. Brit. Lep.," (1896) added nothing to the above, except a table of what he takes to be the philogeny of the *Satyridæ* as a whole, deriving *Pararge* and *Satyrus* from *Epinephele*, p. 336, contrary to the indications given by both larva and pupa as pointed out by Chapman [1895, "Ent. Rec.," vol. vi., p. 101 (City of Lond. Ent. Soc., 1894)].

Kirby, in 1896, "Hand. Lep.," p. 207, included only *aegeria* as the British representative of *Pararge* and placed *megea* in the genus *Satyrus* with *maera*.

He added to previous diagnoses of *Pararge*, "palpi with the terminal joint short" and "wings with the costal nervure much thickened at the base."

Wheeler, in his "Butt. of Switz.," p. 102, etc., 1903, included *maera*, *hiera*, *megea*, *aegeria* and *achine* in *Pararge*. He stated the distinguishing character of the genus to be "upperside hindwing a series of eye-spots following outer margin."

RECENT OPINION ON THE CONTINENT.

Staudinger, in 1901, in his "Cat.," ed. iii., p. 60, gave specific rank to *xiphia*, Fab., and *menara* and added *epimenides*, *epaminondas* and *schrenckii*, while omitting *thibetana*, *episcopalis*, *præusta*, *majuscula*, *dumetorum* and *catena*, all of which had been described previous to 1901, by Leech or Oberthür. Possibly he considered them extrapalaearctic, or was it an ignore-ance of Oberthür's work.

We now come to what is probably the latest published opinion, that of Dr. Seitz.

Seitz, in 1908, "Mac. Lep. Pal.," vol. i., p. 133, considered that the genus *Pararge* may well be an inclusive one as the species are very near each other morphologically and biologically. He included *aegeria* (*xiphia* and *xiphinides*), *thibetana*, *episcopalis*, *præusta*, *rorelana*, *climen*, *eversmanni* (*cashmirensis*), *megea*, *hiera*, *maera* (*maerula*, *menara*, *shakra*), *majuscula*, *deidamia*, *dumetorum*, *achine* and *catena*. He adds very little to the previously given generic characters, speaks of the "feebly marked, somewhat flattened club, the entire wings, with margin undulate on hindwings, sometimes dentate, and sometimes

the inflation of the base of the submedian as well as the costal and median vein."

The three species, *epimenides*, *epaminondas* and *schrenckii*, were placed by Seitz in the genus *Lethe*.

NOTES FROM THE BRITISH MUSEUM COLLECTION.

The species *thibetana*, Obtr., is placed alone in a genus *Tatinga*, separated from the genus *Pararge* (sens. lat.) by the genus *Aphyso-neura*, which contains a superficially very dissimilar species, *A. pigmentaria*, of black and white coloration. *Thibetana* has a facies very similar to *prænsta* and *episcopalis*, and is included in *Pararge* by Seitz.

The remaining species are placed in *Pararge*, which is itself divided into sub-genera as follows:—

PARARGE.

1. *Chonala*, Moore, includes
 - masoui*, broad, irregular, white band.
 - episcopalis*, narrow, irregular, white band.
 - prænsta*, yellow irregular band. All from W. China.
2. *Erebeta*, Moore, includes almost identical species.
 - achine*, from Enrope.
 - catena*, but slightly different from *achine*, from the Far East.
3. *Lopinga*, Moore, contains two species.
 - deidamia* (*menetriesii*) and var. *erebina*, with duller, more indefinite markings.
 - dumetorum*. Both from W. China.
4. *Pararge*, Hb. (sens. str.), includes—
 - aegeria* (*meone*) (*tircis*). A series from Russia are small with very light comparatively large blotches.
 - xiphioides*, very slight, if any, difference from *aegeria* on the upperside.
 - xiphia* appears to be a very much enlarged, strongly marked *aegeria*.
 - meone*, very brightly blotched *aegeria*. The African *meone* still brighter with larger blotches.
5. *Lasiommata*, Westw., includes—
 - megeva*. All the varieties except *tigelinus* (*paramegacra*) are hardly worth varietal names.
 - hiera*. Very uniform from all localities.
 - maderakal*. Not in Museum, does not look a distinct species from Seitz' figure.
 - macra*. var. *monotonia* and var. *adrasta* are the dark and light extremes.
 - var. *sicula*. Extreme development of a series of parallel marginal lines.
 - var. *adrastoides*. Very large bright apical

fascia on the forewing, especially in the ♀, rest of area uniformly dark.

shakra and *maerula*. Practically indistinguishable from *maera*.

majuscula. A large, bright, very distinct species.

menara (*maeroides*) (*nashreddini*). Very comparable to *adrastoides*, and if taken in Europe would be called *maera* undoubtedly.

6. *Ameocera*, Butl., includes—

eversmanni. A quite distinct species. var. *cashmirensis*, with darker suffusion of markings, especially in the ♀.

climene. The form *roxandra* is figured by Herrich-Schäffer, but not described = *caucasica*.

7. *Dira*, Hüb., contains only—

roxelana, which is quite a well differentiated species.

8. *Kirmia*, Moore, includes—

epaminondas (*fentoni*), } two very similar species or
epimenides } forms.

9. *Ninguta*, Moore, contains only—

schrenckii. A very large and very distinct species.

These last three species are not included by Seitz in *Pararge*, but are placed in the genus *Lethe*, to some species of which they apparently have considerable affinities.

REFERENCE LIST OF SPECIES AND CHIEF NAMED FORMS INCLUDED IN THE GENUS PARARGE (SENSU LATO) BY SEITZ AND OTHERS DURING THE LAST 25 YEARS.

aegeria, L., 1758, "Sys. Nat.," ed. x., p. 473.

egerides, Stgr., 1871, "Cat.," ed. ii., p. 30.

tircis (Geoff., 1764, "Hist. Ins.," vol. ii., p. 48), Ernst. and Engr., 1779, "Ins. d'Eur., vol. i., p. 117, etc.

meone, Esp., 1789, "Schm.," Cont. p. 9, pl. 95 (50), fig. 1.

xiphia, Fb., 1775, "Sys. Ent.," p. 492.

xiphioides, Stgr., 1871, "Cat.," ed. ii., p. 30.

intermedia, Tutt, 1896, "Brit. Butt.," p. 388.

bipupillata, Mosley.

meone, Cram, 1782, "Pap. Ex.," vol. iv., p. 51, pl. 314.

thibetana, Obtr., 1876, "Étud.," p. 28, pl. 2.

episcopalis, Obtr., 1885, "Ann. Soc. ent. Fr.," p. ccxxvii.

praeusta, Leech, 1890, "Ent.," p. 188.

roxelana, Cr., 1782, "Pap. Ex.," pl. 151.

climene, Esp., 1783, "Schm.," vol. i. (2), pl. 85.

synclimene, Hb., 1818, "Verz.," p. 59.

roxandra, H.-S., 1850, "Sys. Bearb. Schm.," pl. 99, figs. 471-3.

caucasica, Nordm., 1851, "Bull. Mos.," p. 410, pl. 10.

eversmanni, Ev., 1847, "Bull. Mos.," pl. 2.

cashmirensis, Moore, 1874, "Pr. Zoo. Soc.," p. 265.

- unicolor*, Gr.-Gr., 1892, "Hor. Ross.," p. 384.
dumetorum, Obtr., 1886, "Étud.," p. 23, pl. 4.
fulvenscens, Alph., 1889, "Rom. Mem.," p. 118.
megera, L., 1767, "Sys. Nat.," ed. xii., p. 771.
xiphia, Bdv., 1832, "Icon.," pl. 44.
mediolugens, Fuchs., 1892, "Jhrb. Nass.," p. 87.
megaerina, H.-S., 1856, ? "Sys. Bearb.," vol. vi., p. 19.
lyssa, Bdv., 1832, "Icon.," vol. i., p. 222.
H. G. (Hb.), 1828, "Sam.," figs. 914-7.
tigelius, Bon., 1824, "Mem. Torin.," pl. 1.
paramegaera, Hb., 1823, "Sam.," figs. 842-4.
alberti, Albt., 1895, "Ent. Zeit. = Guben.," p. 57.
transcaspica, Stgr., 1901, "Cat.," ed. iii., p. 60.
hiera, Fb., 1777, "Gen. Ins.," p. 262.
jinmarchica, Neuberg., "Soc. Ent.," xx., p. 49.
maera, L., 1758, "Sys. Nat.," ed. x., p. 437.
monotonia, Schilde., 1885, "Ent. Nachr.," p. 137.
adrasta, Dup., 1832, "Hist. Nat.," sup., vol. i., p. 46.
Hb., 1823, "Sam.," figs. 836-9.
maja, Fuchs., 1873, "Stett. e. Zeit.," p. 98.
sicula, Stgr., 1876, "Stett. e. Zeit.," p. 138.
orientalis, Stgr., 1901, "Cat.," ed. iii., p. 61.
adrastoides, Bien., 1870, "Diss.," p. 30.
menara, Moore, 1865, "Proc. Zool. S.," p. 499, pl. 30.
nashreddini, Chr., 1877, "Hor. Ross.," p. 240, pl. 5.
shakra, Koll., 1848, "Hüg. Kash.," vol. iv., p. 496, pl. 15.
montana, Horm., 1897, "Verh. z.-b. Ges. Wien.," p. 40.
hyglaea, Mab., 1885, "Bull. Soc. Phil., Paris," p. 55.
maeroides, Feld., 1867, "Reise Nov.," vol. iii., pl. 69.
triops, Fuchs., 1886, "Jahr. Nass.," p. 195.
maerac, Esp., 1777, "Schm.," vol. i. (2), pl. 68 (18).
maerula, Feldr., 1867, "Reis. Nov.," Lep., vol. iii., p. 496.
magaerac, Esp., 1777, "Schm.," p. 100, pl. 68 (18), fig. 2.
majuscula, Leech, 1892, "Butt. Chin.," vol. i., p. 67, pl. 12.
maderakel, Gr. Men., 1849, "Lefv. Voy. Abyss.," 6, p. 381.
achine, Scop., 1763, "Ent. Carn.," p. 156.
dejanira, L., 1764, "Mus. Uhr.," p. 282.
mendelensis, Lowe, 1904, "Ent.," p. 272.
achinoides, Butl., 1878, "Cist. Ent.," vol. ii., p. 283.
erimia, Stgr., 1892, "Iris," p. 337.
catena, Leech, 1890, "Ent.," p. 30.
deidamia, Ev., 1851, "Bull. Mosc.," p. 617.
ménetriesii, Brem., 1853, "Schm. N. China," p. 8.
erebina, Butl., 1883, "Ann. and Mag.," p. 278.
epimenides, Mén., 1859, "Schrenk. Reis.," vol. ii., p. 39, pl. 3.
epaminondas, Stgr., 1887, "Mem. Rom.," iii., p. 150, pl. 17.
schrenckii, Mén., 1859, "Bull. Ac. Pet.," p. 215.
maackii, Brem., 1861, "Bull. Ac. Pet.," p. 468.

marginalis, Mot., 1860, "Etudes," vol. ix., p. 29.
 ? (*baldia*, Moore, 1865, "Pro. Zool. Soc., p. 499, pl. 30.)

In the discussion which ensued Mr. Frohawk, in referring to the very close affinity in which the species of some genera stood, instanced the form *surarovi* in the genus *Melanargia* in which even the larva differed but slightly from the larva of *M. galathea*, the form *surarovi* itself being held as a geographical race of the species *M. japygia*.

Mr. Curwen in exhibiting a considerable number of specimens of the genus *Pararge* from the continent, remarked that *P. archine* and *P. aegeria* were both shade-loving species always flying somewhere in close proximity to trees, while *P. megera* and *P. maera* were sun-loving, flying along sunny walls and cliffs. He pointed out that in the case of the extensive genus *Parnassius* one had to consider the species it comprised in groups such as the *apollo* section, the *mnemosyne* section, etc., which was in fact dividing the genus into sub-genera without designating them by special names.

Mr. Edwards referred in the same way to another very large genus, that of *Papilio*, where a similar method of group naming was in vogue, for instance one spoke of the *machaon* group, the *iphielides* group, the *polytes* group, etc.

Mr. Adkin strongly objected to the giving of special names to small groups particularly as they rarely gave an indication of their significance. He was equally averse to the multiplicity of varietal names, names given to every minute aberration, and which in many cases were subsequently found to be redundant or even absurd.

Mr. Turner in reply instanced the enormous number of aberrational and other names which had been applied to *Parnassius apollo*. One of the objects of his paper was to prove the necessity of recognising in some way, that although the species in a large genus were closely allied it was a matter of necessity to, if possible, group them around certain individual species, but at the same time these groups need not be too small nor need they have definite sub-generic names, which in most cases where they have been introduced, as in *Pararge*, are non-informative and hence are a hindrance to progress.

On Rearing Beetles of the Genus *Geotrupes*.

By HUGH MAIN, B.Sc., F.E.S.—*Read January 11th, 1917.*

The life-history of one of these interesting beetles (*Geotrupes stercorarius*) was told us by M. Constant Sano and printed in our "Proceedings" of last year. I was fortunate in getting a personal introduction to the insect by our young friend, and I have since made the acquaintance of several of the other species belonging to the genus.

M. Fabre, the illustrious French naturalist, recorded his observations of a number of the dung-beetles that occurred near his home in Provence, and several of these are also found in Britain. The specific names of some of these insects have unfortunately undergone a good deal of change, and it is by no means certain that the beetle we now call *G. stercorarius* is the species referred to by Fabre or other earlier writers under this name. Hence apparent discrepancies in the records of various authors about an insect may be due to the fact that different species are being referred to under the same name. As a case in point, Fabre gives the autumn as the time of oviposition of *G. stercorarius*, while the insect which now goes by this name lays its eggs in the spring, and it is our *G. spiniger*, whose name he does not mention, which lays its eggs in the autumn. The war has prevented me from getting direct evidence on the subject from France, but I hope to obtain this later on.

It might also be put on record that the interesting account of the parasitism of *Aphodius porcus*, related by Dr. Chapman in the "E. M. M.," 1869, pp. 273-276, should be referred to *G. spiniger*, Marsh, as the host, and not *G. stercorarius*, L., the names having certainly been transposed since the date of the published account.

It has been difficult to learn exactly what happens in the case of insects which carry on their work underground, but an "observation cage," which I have devised, allows one to watch in ease and comfort the whole process of making "dug-outs" and furnishing them with provisions for the nutrition of the young larvæ, and the later stages of pupation and emergence of the perfect insect. The cage consists essentially of two sheets of glass separated by a distance corresponding to the width of the insects under consideration, and the interspace is filled up with earth. Any one with a little knowledge of carpentering can easily make a few cages and in spring or autumn beetles can readily be found that will start work in them.

The glass should be thick, called technically 21-oz., and two pieces 12×9 inches make a convenient size. The wood required consists of :—

- 1 base $9 \times 5 \times \frac{3}{8}$ inches.
- 2 supports $5 \times 2 \times \frac{1}{2}$ inches.
- 2 sides $14\frac{1}{2} \times 1\frac{3}{4} \times \frac{3}{8}$ inches.
- 2 separating pieces $12 \times \frac{1}{2} \times \frac{1}{2}$ inches for sides.
- 1 separating piece $8 \times \frac{1}{2} \times \frac{1}{2}$ inches for bottom.
- 4 supports for glass $12 \times \frac{3}{8} \times \frac{3}{8}$ inches.
- 1 cover $8\frac{7}{8} \times \frac{1}{2}$ bare $\times \frac{1}{2}$ inch.

The two supports are first nailed below the ends of the base, the sides are then screwed on centrally, perpendicular to the ends of the base, and the side and bottom distance pieces nailed centrally to the sides and base respectively. The glass is then put against the distance pieces on each side and the four supports for the glass put in with a screw into each through the sides. The supports can be removed easily for cleaning the glasses and setting up the cage again after use. The ends of the cover are slotted and thinned so that they can rest on the top of the side distance pieces, and are held in position by means of screw eyes inserted into the ends of the latter; a half turn of the screw eyes holds the cover on, a very necessary precaution as the beetles are very strong and active. A piece of stout wire with the ends bent at right angles and passing into two small staples driven into the side pieces near their upper extremities holds these together at the top. A card hung on each cage serves for recording dates and observations.

Clean sieved soil (*e.g.*, top spit) is pressed into the cage layer by layer to within about three inches of the top of the glass. For *G. typhoeus*, however, the sand in which one always finds these insects should be employed. The soil should be damp but not too wet. If in the course of a few months it gets dry it should be moistened from the top as drought is fatal to the successful development of the insects.

A "filling hopper" is a great convenience for putting in the earth and also the food for the beetles. To make this get two pieces of tin $4 \times 2\frac{1}{4}$ inches. Rule a line down the middle of the length of each, make cuts 1 inch long parallel to and half-an-inch from each end and then fold back the upper part of the tin in the same direction as the strips at about an angle of 15° . One tin on the top of each glass forms the hopper which can be used for any number of cages.

In the autumn one finds commonly under the same patch of cow or horse dung, shafts containing *G. stercorarius* and *G. spiniger*, and in certain localities, such as the New Forest, *G. mutator* also, while *G. typhoeus* may likewise be met with, although it is generally more associated with rabbits, deer and sheep. Perhaps *G. sylvaticus* may also be found with the above-mentioned beetles in the same spot. I

have certainly found all these together, except *G. spiniger*, in the spring.

There are two other species in the genus, viz., *G. vernalis* and *G. pyrenaicus*, but these I have not yet found and therefore can say nothing about them at present. Of the first mentioned insects the only one which lays its eggs in autumn is *G. spiniger*, and it continues right on into December, and, as far as I can make out, the beetles then die off in January. I have found a number of dead ones in the field then, and certainly one does not come across any alive again till the following autumn, when the beetles, originating from the ova laid in the preceding winter, come to maturity.

G. mutator emerges in the autumn, but does not commence egg-laying till the following spring, and the resulting beetles appear in the autumn of the same year.

G. stercorarius emerges in the autumn, commences egg-laying in the following spring, but the resulting beetles only appear in the autumn of the succeeding year. This was surmised by M. Sano in his paper, and I find that larvæ from ova laid last spring (1916) are going over the winter nearly full grown and will, therefore, be out next autumn (1917), while ova of *G. mutator* deposited at the same time all produced the beetles last autumn (1916).

Concerning *G. typhoeus* I am not yet quite clear. Beetles taken in the autumn of 1915, did not commence to lay till the spring of 1916, and all the resulting larvæ appeared to be full grown in December, but none have yet pupated (January, 1917). According to Fabre, the beetles should have appeared last autumn, but temperature may have something to do with the difference in the rate of development.

G. sylvaticus has been the most difficult to get to oviposit, and I have to make further investigations with this species before saying much about it. It certainly is found abundantly in the autumn, and again in the spring, at which time it commences egg-laying. I have only one larva and that is passing the winter quite small.

It is exceedingly interesting to watch the division of labour between the male and female beetles when making the cavities and filling them with food for the larvæ. The female is the skilled worker, the male the labourer. It is she who excavates the chamber at the bottom of the shaft, while he takes the earth up to the surface to get rid of it. As he pushes a small mass up the shaft he rotates, making a quarter turn each time followed by a vigorous heave. In the cages, it is necessary to remove the earth brought up to the surface to prevent accumulation, and when it is seen that the food-chamber is about ready, some fresh horse-dung is put into the top of the cage. The male carries down the food and the female takes it from him at or near the bottom of the shaft, carries it in, and rams it into the end of the chamber. She is very particular about the way the various layers of material are added, and goes through a wonderful series of gymnastic feats in the process of

packing them in. After a small amount of food has been put into the cavity by the female, Fabre says, speaking of his *G. stercorarius*, that the male, at the time of the laying of the egg, retires discreetly aside, the female deposits the egg and closes the cavity containing it, and the male then takes up the work of completing the sausage. I have been unable to confirm this and various other details mentioned by Fabre, in the case of any of the species I have had under observation. In every case I have watched, the female has always completed the work of sausage making herself. I have indeed seen a female *G. spiniger* carry out the whole of the work of shaft-sinking, excavating, and making two sausages by herself, while the male was hiding in an adjacent "funk-hole." Fabre contradicts the statement of the German naturalist, Frisch, quoted by Mulsant, that the egg of *G. stercorarius* is laid in an earthen cell. That of *G. spiniger* is certainly placed in a cavity surrounded by clay, the whole lying within some layers of food material as previously described by Dr. Chapman in his paper referred to above. A photograph of one of these cells is seen in Fig. 1, Plate I. As to the way in which the operation is carried out I have unfortunately never been able to observe, not being present at the critical time to see it, but with more leisure at command the whole operation could be easily inspected in one of the cages. There is a small amount of clay surrounding the cavity containing the egg of *G. stercorarius* as noted by Sano. These points can readily be seen in sausages dug up in the field, at the right time of year.

At times the male appears to get tired or perhaps lazy and does not return with a supply of material. The female then calls to him, using the stridulating apparatus situated on the base of the abdomen and the posterior coxæ. It is quite audible to an observer. If he still lags she comes up after him and gives him a good dressing down, clawing him vigorously, and he then once more resumes his task. I found that *G. spiniger* and *G. mutator* took about 24 hours to excavate a food chamber and about 48 hours to fill it. After a short rest they would commence another chamber higher up the shaft, succeeded by a third, fourth, or even a fifth. In the field the food chambers radiate at the same level from the bottom of the shaft eight or ten inches below the surface. It is generally safest to remove the beetles when three or four cells are completed, as they often start a fresh shaft then which in the confined space may interfere with the work already completed.

With regard to *G. typhoeus*, as Fabre has noted, the egg is not laid in the sausage but at a distance of about half an inch from the end of it, in the sand. The larva has to burrow its way to its first meal. This larva has not got the stridulatory apparatus situated on the second and third legs that is found in the larvæ of the other species. Probably the continental coleopterists are well advised in placing this insect in a separate genus viz., *Minotaurus*.

There are many details to be recorded about the methods of work,

the time taken to perform the different operations, etc.; but I must postpone the record of them till after further observations and confirmations of some of the notes already made. In the meantime I hope that others may take the opportunity of making some of the cages and watching these most fascinating insects for themselves. Although the beetles are carrying out the lowly work of scavengers, their work is a most important one, as they convey large quantities of obnoxious matter below the surface of the soil, much being abandoned by the insects during the time when they are engaged upon feeding and not ovipositing, and so serving as a fertiliser. Their habits and mode of work make them appear to be endowed with many virtues and much intelligence. A good deal has been written about them by Fabre in which speculation however plays a large part. His votaries did not show him the insect actually engaged on much of their work, but his assiduity and devotion in recording in most delightful language his observations and speculations make his works an inspiration to many besides his own countrymen. It is not sufficient however for one to be satisfied with reading about things which can be seen for oneself in ones own immediate neighbourhood, hence the evolving of the "Observation cages," and these notes.

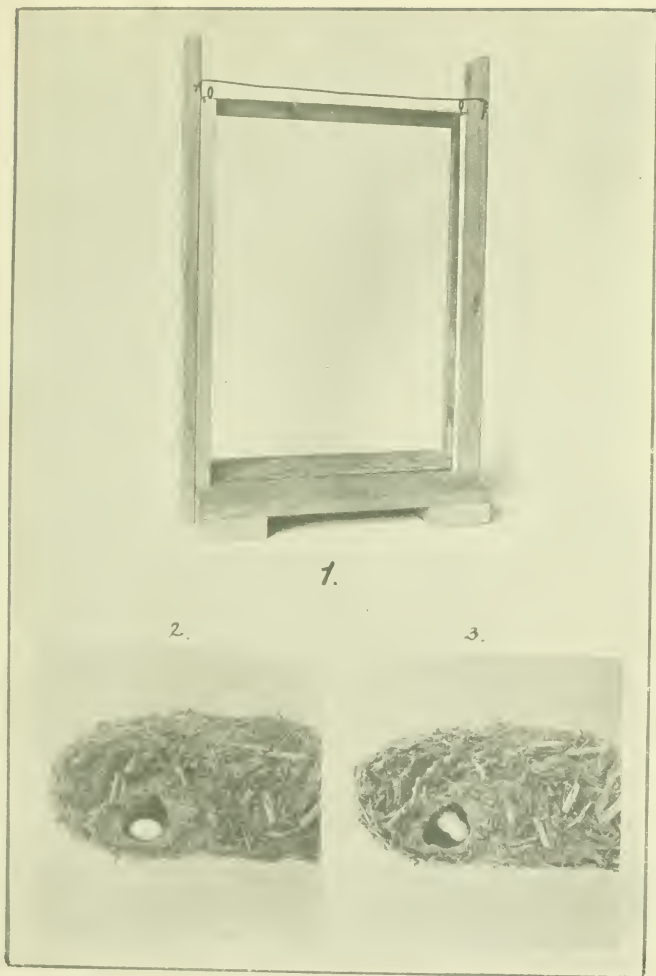


Photo. by H. Main.

1. OBSERVATION CAGE.

2-3. EGG OF *GEOTRUPES* IN CAVITY IN FOOD MASS.

ANNUAL ADDRESS TO THE MEMBERS

OF THE

South London Entomological and Natural History
Society.*Read January 25th, 1917.*

BY HY. J. TURNER, F.E.S.

IT is usual for the member, whom you annually select to preside over your meetings for the year, to give in the Address, which the Bye-laws state that he shall make, a few words on the state and progress of the Society. As you have already had a more or less detailed report of this from the Council I need only say that all our activities have been kept going and even our field-meetings have been successful. There is however one other item of our work, which I cannot pass over, and that is the admirable volume of Proceedings which the Society has published, probably the best of its series, and for which so many active members in one way and another by their mutual help and mutual confidence have had a share in perfecting.

There is another duty and that a sad one: to enumerate those who have passed.

We all knew Fred Enock, many a time has he entertained us in this room with his inimitable expositions of insect life-histories. We had thought to see and hear him again, but with enfeebled health and more than 70 years of a strenuous life he passed away in quiet retirement at Hastings.

Chas. A. Briggs, was scarcely known to most of those who now attend our meetings, but a quarter of a century ago and more he was a most active and enthusiastic member, whose hospitality those present at a field meeting more than once enjoyed. Although for years past he had lived at Lynmouth, he still retained his love for the Society and kept up his membership to the day of his death, at the age of 65.

J. Platt-Barrett was "one of us" and some have known him for more than forty years. He was Secretary of the Society in its infancy, from its birth in 1872 until 1876, when he was elected its President. Removing from London he left the Society, but on his retirement from his life's work in the Deaf and Dumb School at Margate, in 1908, he rejoined and has been on the Council. His subsequent entomological experiences in Sicily and the terrible incidents of his presence in Messina during the earthquake are probably well known to you all. Just after Christmas he succumbed to a heart attack and passed away at the age of 78. His collections go to Horniman's Museum, Forest Hill.

H. A. Sauzé was a most regular attendant who participated in our meetings for some years and acted as Hon. Librarian for a time, but owing to his wife's serious ill-health had rarely been present of late. As to his death I have no particulars.

Of H. W. Martin of Stroud, a country member, I have no details.

"Some we loved
That Time and Fate of all their Vintage prest,
Have drunk their Cup a Round or two before,
And one by one crept silently to Rest."

"Ah! make the most of what we yet may spend,
Before we too into the Dust descend."

For some time after you did me the honour of electing me to preside over your meetings, I failed to find a subject for an address, which would be both interesting and instructive, neither too grave nor too gay, and free from those tedious details, which, although necessary for the proper presentation of a scientific argument, are often wearisome in the hearing. A gleam of hope arose at last. I had put into my hands the proof sheets of the Annual Address read by the President of the Medical Society of London entitled "Shakspeare and Medecine," an admirable composition. Why could not I, in a more humble way, choose for my title?

SHAKSPEARE AND INSECTS.

Critics of our great poet never fail in their admiration for his detailed and accurate knowledge of almost every subject, which directly or indirectly came under his pen. Whether he used fact or incident in medicine, the law, scholastic matters, history, soldiery, the Church, love, royal ways, trade, not only had he the superficial knowledge of the average well-informed citizen, but he generally exhibits a knack of assimilating salient technical details

and using them in their proper setting in his wonderful compositions. I hope to show by a series of extracts that besides being a marvellously acute observer of human character, Shakspeare must have been a by no means casual observer of those smaller items of wild nature, which you and I feel so much pleasure in studying to-day.

What better image of enjoyment have we than that put into the mouth of the delicate Ariel—

“Where the bee sucks, there suck I.”—*Tempest*, v., 1.

The social economy of the bee has attracted writers of all ages, but few can rival the rich and glowing picture in the speech of the Archbishop of Canterbury, a description poetical in the highest degree, and pleasing to both ear and imagination—

“So work the honey bees ;
Creatures that, by a rule in nature, teach
The art of order to a peopled kingdom.
They have a king and officers of sorts,
Where some like magistrates, correct at home ;
Others like merchants, venture trade abroad ;
Others like soldiers, armed in their stings,
Make boot upon the summer’s velvet buds,
Which pillage they with merry march bring home
To the tent royal of their emperor ;
Who, busied in his majesty, surveys
The singing masons building roofs of gold ;
The civil citizens kneading up the honey ;
The poor mechanic porters crowding in
Their heavy burdens at his narrow gate ;
The sad-eyed justice, with his surly hum,
Delivering o’er to executors pale
The lazy yawning drone.”—*Henry V.*, i., 3.

Like all ancient writers, Shakspeare ascribed maleness to the queen bee. In the last passage he calls the head of the bee-kingdom “a king,” and again in the answer of the Goth warrior to the Leader Lucius—

“We’ll follow where thou lead’st
Like stinging bees in hottest summer’s day,
Led by their master to the flowered field.”

Titus Andronicus, ii., 5.

The “drone” is often chosen as a type of laziness, as when Shylock says of his servant Launcelot—

“Drones hive not with me.”—*Merchant of Venice*, ii., 5.

Probably the true nature of the drone in Shakspeare's time was unknown. Although the crime suggested in the following must have been a mistake—

“Drones suck not eagle's blood, but rob bee-hives.”

2 *Henry VI.*, iv., 1.

Is there not here a confusion with the wasp, who may be more justly charged?

The contagious anger of the bees is well imaged, when Warwick in his report to the king that the good Duke Humphrey, the leader of the rebels, had been murdered, says—

“The commons, like an angry hive of bees,
That want their leader, scatter up and down,
And care not who they sting in his revenge.”

2 *Henry VI.*, iii., 2.

We infer that Shakspeare was aware of other than the hive bee, for when Bottom the weaver, in the character of an ass, gives orders to his attendants, he says—

“Monsieur Cobweb, good Monsieur, get your weapons in your hand, and kill me a red-hip'd humble-bee on the top of a thistle; and good Monsieur, bring me the honey bag.”

Midsummer Night's Dream, iv., 1.

In another passage we find an allusion to one of the more solitary species—

“That red-tailed humble-bee.”—*All's Well*, iv., 5.

Sealing-wax to-day is made of lac and resin, but beeswax may have been used in olden times on legal documents, for Jack Cade, when proclaiming his schemes of reform, proceeds—

“Is not this a lamentable thing, that the skin of an innocent lamb should be made into parchment, and that parchment being scribbled o'er should undo a man. Some say the bee stings; but I say 'tis the bee's wax: for I did but seal once to a thing, and I was never my own man since.”—2 *Henry VI.*, iv., 2.

Edgar justifies his opening of the letters confided to Goneril the messenger—

“Leave, gentle wax, and manners, blame us not,
To know our enemies' minds, we'd rip their hearts;
Their papers are more lawful.”—*Lear*, iv., 6.

Again when Imogen receives a letter from her lord Leonatus, her words are—

“ Good wax, thy leave, blest be
 Yon bees, that make these locks of council ! Lovers
 And men in dangerous bonds pray not alike ;
 Though forfeiters you cast in prison yet,
 You clasp young Cupid’s tables.”—*Cymbeline*, iii., 2.

Shakspeare adopted the universal, but incorrect, opinion of his day in the line—

“ Our thighs are packed with wax.”—*2 Henry IV.*, iv., 4.

King Henry V., in the camp at Agincourt, urging that there is good in evil, says—

“ There is some soul of goodness in things evil,
 Would men observingly distil it out ;
 Thus we may gather honey from the weed.”
Henry V., iv., 1.

Honey is a favourite expression with poets and Shakspeare’s use is frequent, although often strained in its application.

When Romeo is waiting in his cell for the visit of his beloved Juliet, Friar Laurence says—

“ These violent delights have violent ends ;”
 and adds—

“ the sweetest honey
 Is loathsome in his own deliciousness,
 And in the taste confounds the appetite ;
 Therefore love moderately.”—*Romeo*, ii., 5.

However the word is seldom used in so literal a sense as in the last extracts, and sometimes the metaphor is unduly stretched.

Norfolk when speaking of Wolsey says—

“ the king hath found
 Matter against him, that for ever mars
 The honey of his language.”—*Henry VIII.*, iii., 2.

Ophelia, bewailing Hamlet’s mental aberration, deplores her own in the words—

“ And I of ladies most abject and wretched,
 That sucked the honey of his music vows.”
Hamlet, iii., 2.

Romeo utters a similarly worded lament at fair Juliet’s tomb—

“ O my love ! my wife !
 Death, that hath sucked the honey of thy breath,
 Hath had no power yet upon thy beauty.”
Romeo and Juliet, v., 3.

"Honey" is even used to intensify the meaning in numerous descriptive phrases, as when Brutus bids the boy attendant Lucius, who was fast asleep, to—

"Enjoy the honey-heavy dew of slumber."—*Julius Caesar*, ii., 1.

The close setting of the bees' cells and the stinging power are both used to increase the effect of the words of Prospero in reply to Caliban's imprecations—

"Thou shalt be pinch'd
As thick as honey-combs : each pinch more stinging
Than bees that made 'em."—*Tempest*, i., 2.

That the poet was aware the bee lost its sting in the wound, the words of Pandarus show—

"Full merrily the humble bee doth sing,
Till she hath lost her honey and her sting;
And being once subdued in armed tail,
Sweet honey and sweet notes together fail."
Troilus and Cressida, v., 12.

So in the sarcasm of Brutus and Cassius against Antony the same idea is uttered—

"*Cas.* The posture of your blows are yet unknown;
But for your words, they rob the Hybla bees,
And leave them honey-less.
Ant. Not sting-less too.
Bru. O! yes, and soundless too;
For you have stolen their buzzing, Antony,
And very wisely threat before you sting."
Julius Caesar, v., 1.

So easy was it to find simile and metaphor in the economy of the bee, that in one scene in 2 Henry IV., it is mentioned twice. First, when the King fears the future of his son from his past bad habits, he says—

"Tis seldom when the bee doth leave her comb
In the dead carrion."—*2 Henry IV.*, iv., 4.

[Was the story of Samson and the Lion the suggestion of this?] and later on when he supposes a sinister motive for the removal of the crown from his pillow—

"How quickly nature falls into revolt,
When gold becomes her object.
For this the foolish, over careful fathers
Have broke their sleeps with thought, their brains with care,

When, like the bee, tolling from every flower
 The virtuous sweets,
 Our thighs are packed with wax, our mouths with honey ;
 We bring it to the hive ; and, like the bees,
 Are murder'd for our pains."—*2 Henry IV.*, iv., 4.

Even up to our own times this killing of the bees to obtain the honey was practiced. The poet more than once shows his objection to this useless method by the terms he used, as when Talbot describes the method of the "witch" Joan of Arc in repulsing the British troops—

"As bees with smoke, and doves with noisome stench,
 Are from their hives and houses driven away."
1 Henry VI., i., 5.

That Shakspeare appreciated the differing characters of bee and wasp we know from various passages.

When the spirits before Prospero's cell discuss the ways of Venus, Cupid is described as—

"her waspish-headed son."—*Tempest.*, iv., 1.

The messenger Silvius used the same term when he gave the letter of Phoebe to Rosalind and foretells the tenour of its contents as if he had himself read them.—

"I know not the contents ; but, as I guess
 By the stern brow and waspish action
 Which she did use as she was writing it,
 It bears an angry tenour."—*As You Like It*, iv., 3.

In the scene where Brutus is using his best endeavours to be reconciled to his former bosom friend Cassius, he protests that henceforth—

"I'll use you for my mirth ; yea, for my laughter,
 When you are waspish."—*Julius Caesar*, iv. 3.

So also in the wooing of Katherine—

"*Pet.* Come, come, you wasp, i' faith you are too angry.
Kath. If I be waspish, best beware my sting.
Pet. My remedy is then to pluck it out.
Kath. Ay, if the fool could find it where it lies.
Pet. Who knows not where a wasp doth wear his sting ?
 In his tail."—*Taming of the Shrew.*, ii., 1.

The same characteristic is used to depict resentful actions. When the wretched Queen Tamore urges her sons to murder she says—

“Let not this wasp outlive us both to sting.”

Titus Andronicus, ii., 3.

Again when Suffolk replies to the query—

“Will the king

Digest this letter of the Cardinal’s?”

he says—

“There be more wasps that buzz about his nose,

Will make this sting the sooner.”—*Henry VIII.*, iii., 2.

Shakspeare’s knowledge of the wasp rapacity in raiding honey is well shown in the metaphor used by Julia to express the detestation of her act in tearing Protheus letter—

“Oh! hateful hands, to tear such loving words:

Injurious wasps, to feed on such sweet honey,

And kill the bees that yield it with your stings!”

Two Gentlemen of Verona, i., 2.

It is more than strange that only twice does Shakespeare mention the insect so universally known as the ant. [See addendum.]

“We’ll set thee to school to an ant, to teach thee there’s no labouring in the winter.”—*Lear*, ii., 4.

When the sweet music of the invisible Ariel comes to the ears of the monster Caliban, even he, with murder in his heart, is constrained to soften, for he says—

“The isle is full of noises,

Sounds and sweet airs: that give delight, and hurt not.”

Tempest, iii., 2.

Who among us does not feel the better for our wanderings in the paths of nature, with the brighter sun and sweeter atmosphere amid the hum of Nature’s workings?

It is curious that two quite mutually destructive views should exist together, yet we find that Hamlet is made to express the common notion at that time—

“If the sun breed maggots in a dead dog.”—*Hamlet*, i., 2.

while numerous other allusions point to “flesh-flies” as the origin of the maggots, as when Trinculo is taken out of “the filthy mantled pool” into which he had fallen in his drunken fit, says,

“I have been in such a pickle since I saw you last, that I fear me will never out of my bones; I shall not fear fly-blowing.”

Tempest, v., 1.

Before following Lucius, Imogen, as Fidele purposing to bury Posthumus, says—

“I’ll follow, Sir. But first, an’t please the Gods,
I’ll hide my master from the flies, as deep
As these poor pickaxes can dig.”—*Cymbeline*, iv., 2.

Ferdinand, when he avows his passion for Miranda, says—

“Would no more endure
This wooden slavery, than I would suffer
The flesh-fly blow my mouth.”—*Tempest*, iii., 1.

And again Biron, when making love to Rosalind, forswears at length the long drawn-out “figures pedantical,” which he had uttered, and asserts that—

“These summer flies
Have blown me full of maggot ostentation.”
Love’s Labour Lost, v., 2.

When Florizel, the Prince of Bohemia, is undecided whither to flee, he uses the simile of the habit of flies at emergence, to rush into the air and disperse whither the chance breeze takes them—

“So we profess
Ourselves to be the slaves of chance, and flies
Of every wind that blows.”—*Winter’s Tale*, iv., 3.

In Shakspeare’s time the “blow-fly” was equally an object of detestation, for we find Doll Tearsheet reviles the beadle, who has arrested her, as—

“A blue-bottle rogue.”—*2 Henry IV.*, v., 4.

When the noble Gloucester reflects upon the cruel fortunes of those who remain faithful to Lear in his banishment, he says—

“As flies to wanton boys, so we to the Gods;
They kill us for their sport.”—*Lear*, iv., 1.

When in Titus’ house, Marcus savagely strikes the dish with a knife, his host at once exclaims—

T. “What dost thou strike at, Marcus, with thy knife?”

M. At that that I have killed, my lord—a fly.

T. Out on thee, murderer! thou kill’st mine heart;
Mine eyes are cloy’d with view of tyranny.
A deed of death done on the innocent
Becomes not Titus’ brother. Get thee gone;
I see thou art not for my company.

M. Alas! my lord, I have but kill’d a fly.

T. Poor harmless fly!

That with his pretty buzzing melody
 Came here to make us merry, and thou hast kill'd him."
Titus Andronicus, iii., 2.

The diminutive size of flies on the whole is often noted. Lear mentions—

"The small gilded fly."—*Lear*, iv., 6.

Queen Mab's driver is described—

"For waggoner, a small grey-coated gnat."
Midsummer Night's Dream, i., 4.

So Imogen says that her eyes had followed her lord—

"till he had melted from
 The smallness of a gnat, to air."—*Cymbeline*, i., 4.

Antipholus of Syracuse reviles his servant Dromio for his unwonted levity, and enforces his remarks by a homely simile—

"When the sun shines, let foolish gnats make sport;
 But creep in crannies, when he hides his beams."
Comedy of Errors, ii., 2.

Flavius to more fully impress Timon that his bought friends are unreliable, says—

"One cloud of winter showers,
 These flies have couched."—*Timon of Athens*, ii., 2.

The sufferings and terror shown by cattle are aptly portrayed in more than one passage. Nestor, the leader in the Grecian camp, in a punning reference, says that the fleet is susceptible more to the winds than the enemy—

"The herd hath more annoyance by the brize
 Than by the tiger."—*Triolus and Cressida*, i., 3.

Scarus describes the flight of Cleopatra after the battle of Actium in no unmeasured terms—

"Yon ribald nag of Egypt,
 Whom leprosy o'ertake! i' the midst o' the fight,
 When vantage like a pair of twins appear'd
 Both as the same, or rather ours the elder,
 The brize upon her, like a cow in June,
 Hoists sail, and flies."—*Antony and Cleopatra*, iii., 8.

The curious belief, which once held sway, that flies become blind in autumn, appears in the remarks of Burgundy—

"Maids well summer'd and warm kept, are like flies at
 Bartholomew tide,—blind though they have their eyes."
Henry V., v., 2.

Passing to one of the unwelcome but insistent companions of man, we find the boy in attendance at Sir John Falstaff's death-bed reports that the old knight said—

“a saw a flea sticking on Bardolph's nose,” which he called “a black soul burning in hell.”—*Henry V.*, ii., 3.

And not infrequently does Shakspeare bring in the “lively hopper,” of which there was evidently no scarcity in the days of “good Queen Bess.”

The carrier at the Inn in Rochester, says—

“Your chamber-lie breeds fleas like a loach.”

I. Henry IV., ii., 1.

The Duke of Orleans, discussing the valour of the soldiers opposed to the English, says to the Constable of France—

“That's a valiant flee that dare eat his breakfast on the lip of a lion.”—*Henry V.*, iii., 7.

Sir Toby Belch infers the white liver of Sir Andrew Ague-cheek by asserting—

“If he were opened and you find so much blood in his liver as will clog the foot of a flea, I'll eat the rest of his anatomy.”

Twelfth Night, iii., 2.

Mrs. Ford is evidently in execution an expert, for to her jealous husband, when he searches the basket, she says—

“If you find a man there he shall die a flea's death.”

Merry Wives, iv., 2.

Poverty and improper food was ordinarily supposed to engender bots, and we find the ostler, at Rochester, says—

“Pease and beans are as dank here as a dog; and that is the next way to give poor jades the bots.”—*I Henry IV.*, ii., 1.

Of the miserable nag of Petruchio it is stated—

“he is so begnawn with bots.”—*Taming of the Shrew*, iii., 2.

The wounded Clifford, ere he dies, compares the supporters of the Duke of York—

“And whither fly the gnats, but to the sun?”

Henry VI. (3), ii., 6.

and again says, that when King Henry held the sway—

“They never then had sprung like summer flies.”

Henry VI. (3), ii., 6.

Cleopatra, foreseeing her coming fate and that of her country, says—

“ My brave Egyptians all, ...
Lie graveless till the flies and gnats of Nile
Have buried them for prey.”—*Antony and Cleopatra*, iii., 11.

“ Dost know the water-fly ? ” asks Hamlet.

Hamlet v., 2.

and Thersites, with his bitter sarcasm, attacks the Grecian noble, Patroclus—

“ Ah ! how the poor world is pestered with such waterflies, diminutives of nature ! ”—*Troilus and Cressida*, v., 1.

But Cleopatra has a different fly in mind in her bitter and hopeless words to her captor, Proculeius—

“ Rather on Nilus mud
Lay me stark naked, and let water-flies
Blow me into abhorring.”—*Antony and Cleopatra*, v., 3.

The destructive power of larvæ have furnished Shakspeare with many a metaphor. Bolingbroke called the creatures of Richard, no doubt on account of their destructive proclivities—

“ The caterpillars of the commonwealth.”—*King Richard II.*, ii., 4.
and again the Duke of York’s reflection on the destruction of his hopes of Kingdom—

“ Thus are my blossoms blasted in the bud,
And caterpillars eat my leaves away.”—*2 Henry VI.*, iii., 1.

“ False caterpillars ” is the epithet bestowed by Jack Cade on his opponents, but the metaphor is never employed more justly than in the colloquy between the gardener and his attendant in *King Richard II.*, on the state of the Kingdom. Instead of silently carrying out the orders of his superiors to “ Cut off the heads of the too fast-growing sprays,” the servant enquires—

“ Why should we in the compass of a pale
Keep law, and form, and due proportion,
Showing as in a model our firm state ;
When our sea-walled garden the whole land
Is full of weeds ; her fairest flowers choked up,
Her fruit trees all unpruned, her hedges ruined,
Her knots dis-ordered and her wholesome herbs
Swarming with caterpillars ? ”—*King Richard II.*, iii., 4.

When Coriolanus has become the invincible leader of the enemies of his native city of Rome, Sicinius, a Roman noble, asks—

"Is't possible that so short a time can alter the condition of a man?"

and most justly is he answered by Menenius—

"There is a difference between a grub and a butterfly; yet your butterfly was a grub."—*Coriolanus*, v., 4.

The observant eye of Shakspeare could not fail to note how destructive were the larvæ of minute moths. Thus Borachio speaks of

"the smirch'd moth-eaten tapestry."

Much Ado about Nothing, iii., 4.

and when the visitor to Virgilia bids her to "lay aside her stitchery" and "play the idle huswife," she taunts her—

"You would be another Penelope; yet they say all the yarn she spun in' Ulysses' absence did but fill Ithaca full of moths."

Coriolanus i., 3.

Those who take delight in the "innocent flower" will appreciate the words of Montague, who uses them as a simile to express his half suspicion of the inexplicable conduct of his son Romeo—

"the bud bit with an envious worm
Ere he can spread his sweet leaves to the air,
Or dedicate his beauty to the sun."—*Romeo and Juliet*, i., 1.

Probably one of the most delicate images that the poet ever employed was when Viola, masquerading as a boy, relates of the inward love of her "sister" that—

"She never told her love;
But let concealment, like a worm i' the bud,
Feed on her damask cheek."—*Twelfth Night*, ii., 4.

The "worm" is often referred to as "the canker" as when Laertes cautions Ophelia against Hamlet's favour—

"The canker galls the infants of the spring,
Too oft, before their buttons be disclosed."

Hamlet, i., 3.

One of the duties Titania imposed upon her fairy attendants is—

"To kill cankers in the musk-rose buds."

Midsummer Night's Dream, ii., 3.

When Prometheus is defending himself against the raillery of his friend Valentine, the image he employs is skilfully turned against himself—

Prometheus. "Yet writers say, as in the sweetest bud
The eating canker dwells, so eating love

Valentine. Inhabits in the finest wits of all.
 And writers say, as the most forward bud
 Is eaten by the canker ere it blow,
 Even so by love, the young slender wit
 Is turned to folly: blasting in the bud.
 Losing his verdure even in the prime."

Two Gentlemen of Verona, i., 1.

Not always is the "worm" a "canker." Othello when he demands the handkerchief, venerated as the dying gift of his mother, says—

"The worms were hallowed that did breed the silk."

Othello, iii., 4.

The temptation to use the nut without a kernel as a figure could hardly be overlooked, and we find it often used as in the terse sketch of the character, or rather absence of character, of Parolles—

"There can be no kernel in this light nut."

All's Well that Ends Well, ii., 5.

The wretched Thersites in his scurrilous abuse of the defenders of Greece, Achilles and Ajax, against Hector, says—

"Hector shall have a great catch if he knock out either of your brains; a' were as good crack a fusty nut with no kernel."

Troilus and Cressida, ii., 1.

When Rosalind is angry with her lover as he "comes not," Bella adds fuel to the fire by her remarks that she thought him—

"as concave as a worm-eaten nut."—*As You Like It*, iii., 4.

Very pretty is the passage where the equipage of the fairy Queen Mab is described—

"Her chariot is an empty hazel nut
 Made by the joiner squirrel, or old grub,
 Time out of mind the fairies coach-maker."

Romeo and Juliet, i., 4.

'Tis not always that "worm" in Shakspeare means larva, for no doubt we remember Cleopatra's request—

"Hast thou the pretty worm of Nilus here, that kills and pains not?"—*Antony and Cleopatra*, v., 2.

When Hamlet is at supper with the king, subsequent to the killing of the poor old eavesdropper, Polonius, he says that Polonius is "at supper," "not where he eats but where he is eaten," and goes on to say—

“Your worm is your only emperor for diet.
We fat all creatures else to fat us,
And we fat ourselves for maggots.”—*Hamlet*, iv., 3.

It is quite clear that worm is used here again for maggot, but when the Duke addresses Claudius—

“Thou art by no means valiant,
For thou dost fear the soft and tender fork
Of a poor worm.”—*Measure for Measure*, iii., 1.

that again the poison-snake is meant.

Poins, in answer to Prince Hal's query at the Boar's Head Tavern, “Shall we be merry?” says—

“As merry as Crickets.”—*1 Henry IV.*, ii., 4.

Thus Shakespere accepted the common notion that the chirping of the fire-side was significant of mirth.

How pretty is the delicate description of Queen Mab's equipage, part of which we have already quoted—

“Her waggon spokes made of long spinner's legs,
The cover of the wings of grasshoppers,
The traces of the smallest spider's web,
The collars of the moonshine's watery beams,
Her whip of cricket's bone; the lash, of film.”
Midsummer Night's Dream, i., 4.

Frequently, when the poet wishes to emphasise complete stillness, he appeals to the cricket.

Lady Macbeth, in reply to Macbeth's question after the murder of Duncan, if she heard aught, says—

“I heard the owls scream and the crickets cry.”—*Macbeth*, ii., 2.

Again, when Iachimo surveys the chamber where Imogen lies sleeping, his first words are—

“The crickets sing, and man's o'er-labour'd sense
Repairs itself by rest.”—*Cymbeline*, ii., 2.

That insects hear, has often been questioned by the naturalist. We have the poet's view when young Mamillius, dared by Hermione to fright her with goblin tales, says—

“I will tell it softly;
Yon crickets shall not hear me.”—*Winter's Tale*, ii., 1.

One would have thought that the rapacious, devastating powers of the locust would have afforded a wealth of imagery, and that by reading and report the poet would have been familiar with it, yet

the word "locust" occurs but once, and obviously it has no insect interpretation.

"Fill thy purse with money," says Iago to Roderigo, "the food that to him now is as luscious as locusts."—*Othello*, i., 3.

Naturally one would expect to find the butterfly imaged in many ways, by one who was so conversant with the character and heart of man. Yet the references are very few, and appeal but slightly to the sense of beauty. Achilles reflects as the Grecian lords pass him with greeting or disdain—

"What the declined is
He shall as soon read in the eyes of others,
As feel in his own fall; for men like butterflies,
Show not their mealy wings but in the summer."

Troilus and Cressida, iii., 3.

Was it the gloriously coloured wings of the "peacock" butterfly that were intended in the order of Titania to her fairy attendants in her passion for Bottom the weaver?—

"pluck the wings from painted butterflies,
To fan the moonbeams from his sleeping eyes."

Midsummer Night's Dream, iii., 1.

Then there is the whole piece in which the phrase "gilded butterflies" is embedded, which emphasises the then popular notion, that those who noticed butterflies were insignificant and trifling persons.

The old monarch Lear, "fourscore and upwards," when sent to prison by his unnatural daughter, addresses his younger and faithful daughter in the simple but pathetic words—

"Come, let's away to prison,
We two alone will sing like birds i' the cage;
When thou dost ask me blessing, I'll kneel down
And ask of thee forgiveness: So we'll live,
And pray, and sing, and tell old tales, and laugh
At gilded butterflies, and hear poor rogues
Talk of court news and we'll talk with them too,
Who loses, and who wins; who's in and who's out;
And take upon us the mystery of things,
As if we were God's spies."—*Lear*, v., 3.

Still the same idea underlies the scene when Virgilia, the wife of Coriolanus, is visited by her friend Valeria, and is asked by her, "How does your little son?" she answers—

"O my troth, I looked upon him o' Wednesday half an hour

together. I saw him run after a gilded butterfly; and when he caught it, he let it go again, and after it again, and over and over he comes, and up again; catch'd it again; whether his fall enraged him, or how 'twas, he did so set his teeth, and tear it. O! I warrant how he mammock'd it."—*Coriolanus*, i., 3.

Again, in the same play, when Marcius Coriolanus, with the enemy Volscians is threatening his native city, Rome, Cominius, the Roman general, describes them to Menenius in these words—

“He is their God: he leads them like a thing
Made by some other deity than Nature,
That shapes man better; and they follow him
Against us brats, with no less confidence
Than boys pursuing summer butterflies,
Or butchers killing flies.”—*Coriolanus*, iv., 6.

“Moth” is a term often used for something trifling, and we have—

“A moth will turn the balance.”—*Midsummer Night's Dream*, v., 1.

“Wash every moth out of his conscience.”—*Henry V.*, i., 4.

A pathetic reference is in the scene between Arthur and Hubert—

Arth. “Is there no remedy?
Hub. None; but to lose your eyes.
Arth. Oh Heaven! that there were but a moth in yours;
A grain, a dust, a gnat, a wandering hair,
Any annoyance in that precious sense!
Then feeling what small things are boist'rous there,
Your vile intent must needs seem horrible.”
King John, iv., 1.

One hardly understands the reference of the gentle Desdemona who calls herself, when pleading for leave to accompany Othello on a diplomatic journey—

“A moth of peace.”—*Othello*, i., 3.

When the Prince of Arragon, the disappointed suitor, leaves Portia, he utters the beautiful simile, which is so well known—

“Thus bath the candle singed the moth.”
Merchant of Venice, ii., 9.

Who has not heard the weird hum which strikes one's ears when twilight falls upon a country scene?—

“Beetles black approach not here” is the injunction of the attendants of the sleeping fairy-queen Titania.

Midsummer Night's Dream, ii., 3.

Macbeth when bracing up his courage for the "dreadful deed," promises Lady Macbeth—

"Ere the bat hath flown
His cloister'd flight; ere to black Hecate's summons
The shard-borne beetle, with his drowsy hums,
Hath rung night's yawning peal, there shall be done
A deed of dreadful note."—*Macbeth*, iii., 2.

"Shard" appears to have been a common term, for we find the friend of Mark Antony images the close unity of the Triumvirs when he speaks of Lepidus—

"They are his shards and he their beetle."
Antony and Cleopatra, iii., 4.

Again Belarius in the mountains of Wales in voicing his love of the wild freedom and the healthy pleasure there is in danger, says—

"Often to our comfort do we find
The sharded beetle in a safer hold
Than is the full-wing'd eagle."—*Cymbeline*, iii., 3.

Not that "shard" always has this meaning, for it occurs in its primitive English significance—a piece of broken tile—when the priest says of Ophelia—

"Shards, flints, and pebbles should be thrown on her."
Hamlet, v., 1.

There is some ambiguity in the wording put by the poet into the mouth of Isabel imaging her fear for Claudio in prison and in expectation of death—

"The poor beetle that we tread upon
In corporal sufferance finds a pang as great
As when a giant dies."—*Measure for Measure*, iii., 1.

It would appear at first that the ancient view that insects suffered pain was here voiced, but like many a text divorced from its context, a wrong impression is produced. Close students of Shakspeare years ago pointed out that there were few instances of a more complete perversion of the meaning of a poetical quotation by omission of the context than in this passage. The lines preceding the passage quoted—

"Oh! I do fear thee, Claudio; and I quake,
Lest thou a feverous life should'st entertain,
And six or seven winters more respect
Than a perpetual honour. Darest thou die?
The sense of death is most in apprehension;"

leave no doubt that the purpose was to show how *little* pain a man really felt in dying.

Another passage where "beetle" occurs is in Caliban's imprecations against Prospero—

"All the charms
Of Sycorax, toads, beetles, bats, light on you."
Tempest, i., 2.

That one brought up in the country should know the glow-worm might be assured. Titania the spellbound queen instructs her hand-maid fairies "Pease-blossom! Cobweb! Moth! and Mustard-seed!" to work for Bottom and—

"Steal from the humble-bees,
And for night-tapers crop their waxen thighs
And light them at the fiery glow-worms eyes."
Midsummer Night's Dream, iii., 1.

Of course "glow-worms eyes" is a poetic licence which again occurs when the ghost urges his adieu to Hamlet—

"The glow-worm shews the matin to be near,
And 'gins to pale his uneffectual fire."—*Hamlet*, i., 5.

In one passage we find a beetle used in a simile to enforce the dizzy height of Dover cliff—

"The crows and choughs that wing the midway air,
Show scarce so gross as beetles."—*Lear*, iv., 6.

In Hermione's reply to the spiteful jealousy of Leontes—

"Sir, spare your threats,
The bug which you will fright me with I seek."
Winter's Tale, iii., 1.

"The bug" is not that beastie to which we could apply the words of Jacques—

"let's meet as little as we can."—*As You Like It*, iii., 3.

but as always in Shakspeare is short for "bug-bear."

In days when cleanliness of person was not quite so possible as at present another domestic beast was more common.

When the rival justices are holding forth on the importance of Justice Shallow and his family, Slender says—

"All his successors gone before him have done it, and all his ancestors that come after him may: they may give the dozen white lues in their coat.

Shallow. Tis an old coat.

Frans. The dozen white louses do become an old coat well : it agrees well passant ; it is a familiar beast to man, and signifies love."—*Merry Wives of Windsor*, i., 1.

In conclusion I must say with Mark Antony—

"I am no orator."—*Julius Caesar*, iii., 2.

Yet, as King Richard's queen, Elizabeth says—

"An honest tale speeds best, being plainly told."

Richard III., iv., 4.

and Theseus says—

"For never anything can be amiss
When simpleness and duty tender it."

Midsummer Night's Dream, v., 1.

May I beg you to excuse this thing of

"Shreds and patches."—*Hamlet*, iii., 4.

and trust that you have not found it

"Weary, stale, flat and unprofitable."—*Hamlet*, iii., 2.

In his reply to the Vote of Thanks the President said that he might use words put into the mouth of Hamlet

"Beggard that I am, for I am even poor in thanks,
But I thank you."—*Hamlet*, ii., 2.

and expressed the hope that he might be able to feel with Ariel, when his time came to vacate the chair that—

"I have done thee worthy service ;
Told thee no lies ; made no mistakings."

Tempest, i., 2.

ADDENDUM:—p. 30. Insert—

And Hotspur explains as one of the reasons of his anger with Mortimer's father—

"With telling me of the moldwarp of the ant."

I. Henry IV., iii., 1.

N.B.—I am indebted to Mr. Brooks for pointing out that the word "pismire" is an old English name for ant.

"Pismire" is once used by the poet. Hotspur in his graphic description of his feelings when he hears of "this vile politician Bolingbroke" says—

"I am whipp'd and scourged with rods,
Nettled, and stung with pismires."

I. Henry IV., i., 240.

ABSTRACT OF PROCEEDINGS.

FEBRUARY 10th, 1916.

MR. HY. J. TURNER, F.E.S., *President*, in the chair.

Mr. Stanley Edwards exhibited a fasciated branch of the ash tree from Blackheath, obtained by Dr. Ofenheim.

Mr. L. W. Newman exhibited a spray of hawthorn in almost full leaf, and also the fully opened catkins of willow. He stated that he had on the previous day seen quite fully 50 bushes of sallow in full bloom in the N. Kent area. Mr. Newman also showed a gynandromorphous specimen of *Polygonia c-album* and pointed out that the sexes differed in size, contour of the outer margins of the wings, and also in the markings of the undersides. These differences were quite apparent in the exhibit.

Mr. Turner stated he had examined all records of gynandromorphs up to a recent date and as far as he had ascertained the example was unique. Mr. Frohawk confirmed this opinion.

Mr. Sperring exhibited aberrations of *Argynnis adippe* and *Amorpha populi*. The *A. adippe* was taken at Swinley, during the Field Meeting in 1915, and had an enlargement and coalescence of the black spots crossing the disc of the forewings. The *A. populi* had the large inner-marginal blotch on the hindwing of a bright orange-red colour instead of dull brick-red.

Mr. C. B. Williams exhibited some very good coloured drawings, magnified about 30 diameters, of the larvæ of two British species of Neuroptera, *Coniopteryx tineiformis* and *Semidalis alenrodiformis*. These larvæ are predaceous and feed on young scale insects, mites, and eggs of insects and spiders. The drawings were made by Mr. H. J. Osterstock.

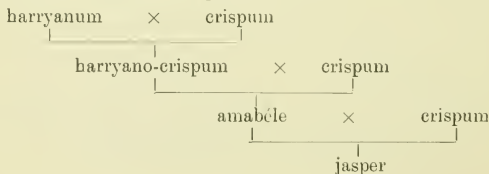
Mr. Hugh Main exhibited one of his observation cages in which he was rearing the larvæ of the Coleopteron *Geotrupes spiniger* from ova. He stated that many of his observations were absolutely at variance with those published by the late M. Jules Fabre.

Mr. Hy. J. Turner exhibited a series of *Salebria semirubella* (*caruella*) and contributed the following note.

"At the last meeting Mr. Stallman exhibited this species and pointed out the form with a white costa to the forewings. In the short series now exhibited are three forms of aberration—(1) with white costal streak, (2) with yellow costal streak, (3) with the whole costal area suffused with very dark scales almost obliterating the rosy colour of the type. Hübner named the form with the yellow costa ab. *sanguinella* and Staudinger's short diagnosis is "al. ant. vitta costali flava." Stephens says that *sanguinella* has the costa "white or pale." Ragonot described a form with white costa as ab. *icterella*, which Staudinger shortly diagnosed as "al. ant. flavis, costa alba, ciliis roseis." This form with white costa might according to Stephens, come under *sanguinella* as "pale," while it does not fully agree with Ragonot's *icterella*, which has yellow and not rosy forewings. The other form in the series, in which the costal area is suffused with very dark scales has not yet received a name, but has been observed and noted by various authors from Stephens onwards. The species is extremely local with a wide range extending from Ireland, across Europe and Asia to Japan, and is restricted to chalk districts. So local is this species that the late Mr. C. G. Barrett, who had collected extensively in many parts of England, Wales, and Ireland, had never taken it himself. I have taken this species at several places on the southern face of the North Downs in the day-time in sunshine, when it was disturbed. It is stated to fly at night."

Mr. W. J. Kaye exhibited the flowering sprays of several hybrid orchids of his own growing, and contributed the following note.

"The fine *Odontoglossum jasper* is a tertiary hybrid of *harryanum* and *crispum*, and exhibits the remarkable phenomenon that it shows that there has been complete fusion each time and thus the last form *jasper* exhibits practically $\frac{7}{8}$ *crispum* to $\frac{1}{8}$ *harryanum*, it being really an octeroon, assuming *harryanum* to be the nigger and *crispum* the white man. The parentage is as follows :—



"The other hybrids shown are *Odontoglossum triumphosum*, a primary hybrid showing complete fusion between *O. triumphans* and *O. cirrhosum*; *Odontoglossum penultum*, a crossing of two different hybrids, involving three species; and *Odontoglossum tristan*, a crossing between a species and a hybrid, also involving three species."

Mr. B. S. Williams exhibited a series of *Hydroecia paludis* from St. Anne's-on-Sea, comprising 18 specimens taken in 1914, showing the great amount of variation of ground colour including pale ochreous, red, and fuscous grey forms. The reniform stigmata also varied from white to orange. Some forms showed a considerable amount of chestnut reticulation, whilst in others this character was obsolete.

Mr. Frohawk brought a newspaper cutting announcing the supposed appearance of the cuckoo at Minster. He stated that the earliest authentic record of the arrival of this migrant in this country was March 29th. It was remarked that the late Prof. Lydeker was once led to make a similar announcement and afterwards to find that he had been deceived by the wonderful imitation of the note by a country labourer.

Mr. Sich in remarking on the early season said that at Epping the hawthorns were much advanced, and at Hampstead he had seen two bushes that were perfectly green with expanded leaves.

Mr. Frohawk remarked on the extraordinary early dates for the blackbirds to commence singing. He had heard them on Dec. 26th, Jan. 1st, and Jan. 7th, whereas normally they did not begin until the end of February or the beginning of March. He also knew of a starling that had already commenced to sit in Cambridgeshire. There has been a nest in this situation for the last 16 years. Several members had noted the early state of the Hawthorn, and the Celandine and Blackthorn were also already in flower in places.

Mr. Robert Adkin read a paper entitled: "*Oenueria dispar* in Britain," and in illustration of his remarks exhibited a short series of specimens of the form that occurred in the fen districts about the years 1830-1840; of the form commonly reared in confinement for many generations, the specimens shown having been bred about 1880; and of specimens reared from ova obtained from a female taken wild in Huntingdonshire in 1907; also a male specimen bred from a wild larva found at Folkestone in 1899, and an unusually large female taken at Eastbourne in 1909 (page 1.)

Mr. H. A. Leeds exhibited the remainder of the brood reared

from the Huntingdonshire female referred to above, also a male taken wild in the same locality, one of several that he had taken a few years previously, and explained that believing *O. dispar* was a common species he had taken no special care to look for it.

Mr. B. W. Adkin also exhibited, among others, a series reared from wild larvæ taken on hedges in the neighbourhood of Malvern in 1907, and it was noted that the females much resembled the old fen captured examples.

In the discussion which followed Mr. F. W. Frohawk remarked that the shape of the wings, more particularly of the females, of the old specimens taken in the fens, appeared to be somewhat different in shape from those that had been reared in confinement, and the President said that it had been frequently noted that specimens that had been long in-bred often showed peculiarities of wing formation.

Mr. C. B. Williams said that he had recently visited those parts of the United States of America where *Ocneria dispar* was devastating the fruit trees, and where a large number of trained entomologists were continually engaged in an endeavour to cope with the mischief. In the course of their investigations it was very necessary for them to find out how the species spread from one part to another with such rapidity as was known to be the case. It was noted that the very young larvæ were covered with abnormally long hairs which rendered them easily dislodged from the trees by the wind. With a view to ascertaining whether the larvæ in this stage could thus be carried to any considerable distance, a large wire screen was erected on an island eleven miles off the coast of a badly infected district, at a time when a strong wind was blowing off the land, and the meshes of the wire were well greased. Upon subsequent examination considerable numbers of the young larvæ were found adhering to the screen, evidently having been carried over the eleven miles between the mainland and the island on the breeze.

Mr. Sich thought it was also quite possible that the range of the species might be increased by the migration of the impregnated female moths.

Mr. R. Adkin in winding up the discussion said he agreed with Mr. Sich in thinking that it was quite possible that migration might, in some cases, account for the spread of the species; it was true that it had been asserted that the female moths did not fly to any great distance, but he thought that in this, as in the case of some other sluggish species, the powers of flight were very great

when once they were called into action. But whether this were so or not, the case of the young larvæ being carried on the wind, as related by Mr. Williams, would offer a probable explanation of the eruption of the species that occurred in the fens in the earlier part of last century, and possibly account for the occasional finding of larvæ in other parts of the country, for it having once been demonstrated that the young larvæ can be carried on the wind the distance to which they might be taken was limited only by the force and the duration of the breeze.

FEBRUARY 24th, 1916.

This meeting was devoted to the exhibition of lantern-slides.

Mr. Main exhibited a series of slides illustrating the parasites of the larvæ of *Orygia antiqua*.

Mr. Sperring exhibited a considerable number of slides in colour, kindly lent by the Paget Company.

Mr. Dennis exhibited slides of the leafy willow gall, the flowers of *Aspidistra*, views of Water-end in Weymes Park, where the stream disappears underground in dry summer weather, as does the Mole at Burford Bridge, the flowers of the Milkwort, flowers of the buckthorn, *Rhamnus frangula*, the pappus fruit of the Goatsbeard, and views of Drosserfield Lake in Essex, and of Epping Forest near the "Wake Arms."

Mr. Colthrup exhibited a number of sets of slides kindly lent by the Nature Photographic Society and also some of his own. These series included sets of slides of the Redshank, Ringed Plover, Common Tern, and Lapwing on and about their nests, concerning which he remarked that when the bird's commence to sit, those that lay four eggs arrange them point inwards, but those that lay only three usually arrange two side by side and the third at right angles across the points of the other two. The remaining slides were a series of the Wheatear feeding its young, various species of butterflies at rest on flowers, a number of larvæ feeding or resting, several illustrating the habits of spiders, and a considerable number showing moths at rest on tree-trunks, fences, etc. It was remarked that it was most unusual to find *Aspilates ochrearia (citraria)* resting on a tree-trunk, and in the series of *Bryophila muralis* it was noted that the insect was in varied positions, even head downwards.

MARCH 9th, 1916.

Mr. L. W. Newman, on behalf of A. Horne, Esq., of Aberdeen, exhibited specimens of *Pieris brassicae* bred from wild Aberdeenshire larvæ, showing a very distinct pink tint all over the wings and especially noticeable in the males. The aberrational colour was of the same character, but not so pronounced, as that of the remarkable male of the same species exhibited by Mr. Percy Bright at the Special Exhibition of the Society in November last. Mr. Newman also showed a Noctuid taken wild in Aberdeenshire, generally considered as a dwarf and varietal form of *Mamestra thalassina*, which species it resembled closely in all basal and discal markings. The outer marginal markings, fringe, etc., were very indistinct and suffused, while the insect was barely two-thirds the size of normal *M. thalassina*.

Mr. G. T. Porritt exhibited some half a dozen fine aberrations of *Abraças grossulariata* bred from wild larvæ taken near Huddersfield, including (1) an extraordinary lead and yellow coloured specimen having a large conspicuous star-shaped pale mark on the right forewing, (2) a female ab. *varleyata* with a black body, the only one with that form of abnormality he had ever bred or even heard of, as hitherto this aberration had always a constantly normal body, (3) two examples in which the yellow band of the forewings was complete and much emphasised over the black markings, one specimen had almost spotless hindwings.

Mr. Robert Adkin exhibited dwarf specimens of several species of butterflies, they were all captured, not bred examples, there was therefore no question of their size having been artificially reduced. In the following list of the species the wing expanse is given in millimetres and the place of capture quoted:—

Pieris rapæ, ♂ 33mm., Colchester.

Pieris napi, ♀ 38mm., Colchester. ♀ 39 mm., Braemar.

Euchloë cardamines, ♂ 32mm., Royden. ♀ 34mm., Colchester.

Melitæa athalia, 35mm., Dedham.

Aglais urticae, 38mm., Dundee.

Epinephele jurtina, ♂ 37mm., Newport, I.W. ♂ 38mm., Eastbourne.

Polyommatus icarus, ♂ 22mm., Eastbourne.

Agriades coridon, ♂ 30mm., Eastbourne. ♂ 32mm., Eastbourne.

Mr. Adkin said that although several of the above specimens were of much less wing expanse than generally recognised as a minimum for the species, notably *P. rapæ*, *E. cardamines*, *A. urticae*

and *P. icarus*, which varied between 13mm. and 5mm., smaller than the minimum sizes given by various authors, others practically agreed with such minima, notably *P. napi*, *M. athalia* and *A. coridon*. Of these, the last mentioned was the only species in regard to which he had been able to make any extended investigations, but from observations extending over many years he found that these 30mm. examples of *A. coridon* were not infrequently recurrent, and he was of opinion that in such species there was a well established small race, independent of any accidental circumstances, such as shortness of food or similar happenings, to which some other exceptional miniature examples might possibly be ascribed.

Mr. Frohawk exhibited specimens of *Pyrameis atalanta*, *P. cardui* and *Vanessa io*, to show extremes in size. The measurements of the specimens exhibited were—

P. atalanta, Crohamhurst, 1880, 47mm., and Wallington, 1914, 76mm.

P. cardui, Littlehampton, 1888, 45mm., and bred New Forest, 1892, 72mm.

V. io, Chattenden, 1868, 47mm., and bred Ventor, 1891, 73mm.

He remarked that *E. antiopa*, *P. atalanta* and *V. io* were somewhat prone to extremes, whereas *P. cardui* varied but little in size. As to the existence of dwarf races, he was convinced that there was one of *Lycaena arion* in Cornwall, as year after year he had there met with, or known of, dwarf examples being taken. In 1893 most of the New Forest examples of *Dryas paphia* were exceptionally small; this was not racial but due to the excessive dryness of the season during the later portion of the larval period. He also remarked on the wandering habits of the Vanessid larvæ, and the power this gave them of seeking far distant food when their first supply was exhausted. Mr. Curwen said that he had met with a small race of *Vanessa io* near Caux, Montreux, Switzerland. Mr. Turner suggested that dwarfing in Alpine species of Vanessids would possibly often occur from the superabundance of the larvæ causing an absence of food. It was pointed out that this would not occur with a more or less solitary species like *P. atalanta*.

Mr. Bunnett exhibited specimens of *Euvanessa antiopa* taken near Lake Winnipegosis, Canada, and a large water-bug (Hemipteron) *Benicuss griseus*, taken at the electric light in the same place. He also showed a photograph of *Samia cecropia* from Canada.

Mr. Stanley Edwards exhibited species of the African genus,

Euryphene, of butterflies to show the extreme divergence of sexual dimorphism, some of the sex forms having originally been described as separate species. There were included *E. phranza*, *E. cocalia*, *E. sophus*, and *E. plantilla*, with the allied *Cymothoe sangaris* and *Euphædra arcadius*.

Mr. Frohawk exhibited a stoat which had been killed in the transition stage of the alteration of its fur from summer to winter colour, and made the following remarks:—

“I exhibit a remarkable and probably unique variety of the stoat. The specimen was obtained in Cambridgeshire several years ago. The chief peculiarity is the manner in which the white is distributed over the sides of the neck and back, leaving a lateral band of the normal rufous-brown colouring along the neck and body; consequently the change to the white winter coat has taken place in a reverse order. In normal specimens the change to white is assumed by the extension of the white from the belly upwards, leaving the brown along the middle of the back, as well as on the upper part of the head and neck. The last portion to remain brown is a ring encircling the eyes; when the rings finally disappear the animal is then in the complete ermine dress.”

MARCH 23rd, 1916.

Mr. E. A. Syms, of Wanstead, was elected a member.

Mr. W. J. Kaye exhibited the roots of the plant of *Orobanche minor* previously exhibited (Proc. 1915, p. 141), which was parasitical on the roots of a species of *Salvia* in a pot in his garden. It was pointed out that the roots of the *Orobanche* grow over and clasp those of the *Salvia*.

The Rev. F. M. B. Carr exhibited a box of Lepidoptera received by him from the Andes, near Tolima in Colombia, S. America, mostly taken at an altitude of about 6,000 feet. The following are the chief species shown:—

Morpho peleides, *Papilio phaton*, *P. pæon*, *Actinote*, sp. ? *Anartia jatropha*, *A. amalthea*, *Peridromia ferentina*, *Catagramma pitheas*, *Oreoschistus*, sp. ? *Danaus eresimus*, *Pyrrhopyge*, sp. ? *Mechanitis menapis*, *Dynamine mylitta*, *Colenis tithraustus*, *C. juno*, *C. moneta*, *Anæa morvus* (?), *Dismorphia nemesis*, *D. melite*, *Heliconius clysonymus*, *H. charithonia*, *Megalura coresia*, *M. cinna*, *Leodonta marginata*, *Cosmosoma tigris*, *Hymenitis andromache*, *Leucothyris aquata*.

Mr. Carr also exhibited a box of Lepidoptera, collected in North Staffordshire last June, including a series of *Adscita geryon*: a very small pair of *Euchloë cardamines*: a short series of *Hydriomena impluviata*, including some dark forms; a *Eulype hastata*: a series of *Tephrosia punctularia* from Cannock Chase, including some rather pretty forms; and a series of *T. crepuscularia*, including both pale and dark forms, nearly all taken in the same wood. One female has both forewings and right hindwing of the typical dark form, but left hindwing of the typical light form and very strongly marked.

Mr. H. Leeds exhibited aberrant examples of the following species:—

Dysstroma citrata (*immanata*) from Hunts and Loch Lomond.

Acronicta leporina var. *bradyporina*, usual British form, and the type *leporina* from the Norfolk Broads, July 17th, 1915.

Agriopsis aprilina, with the central area heavily marked with black. Herts, Sept. 25th, 1914.

Polia chi, with wedge-shaped markings inside margin, large and very distinct. Loch Lomond, Aug. 1910.

Xylophasia monoglypha, 5 aberrations from Hunts, including an extreme *infuscata* form approaching *æthiops*.

Taeniocampa gothica of various forms.

Dicycla oo, seven specimens from Hunts, including ab. *venago*.

Mr. B. S. Williams exhibited a photograph of a fasciated stem of a tulip bearing three flowers and a painting of the rare orchid *Cypripedium fairianum*.

Mr. F. H. Stallman exhibited a most unusual aberration of the Coleopteron *Rhagium bifasciatum*, in which the whole of the surface of the elytra was of a unicolorous pale buff colour. It was not an immature specimen and came from Leith Hill, taken on March 19th.

Mr. Curwen exhibited a box of European Lepidoptera showing extremes of size. The following were the measurements of the various species shown:—

[Figures are mm., those in brackets previous records taken from Wheeler's "Butt. of Switz."]]

Parnassius apollo, ♀, Zermatt, 64. ♀, Digne, 100.

Pieris rapæ, England, 40 (37). Mickleham, 56 (58).

Pieris napi, ♂, England, 36; ♀, Woodstock, 40. ♂, Folkestone, 60.

Euchloë cardamines, ♂, England, 36 (31). ♂, Beaconsfield, 48 (49).

Colias edusa, ♀, *helice*, England, 46 (32). ♀, La Roche, 60 (52).

- Limenitis sibilla*, ♂, Laon, 48. ♀, New Forest, 64.
Vanessa io, Caux, 48. ♀, Swinley, 72.
Aglais urticae, Bognor, 48. Swinley, 58.
Melitaea aurinia var. *merope*, Montana, 37. ♀, Swansea, 50.
Melitaea cinxia, Aix-le-Bains, 37. Hyères, 52.
Melitaea didyma, ♂, Larche, 36 (32). ♀, Bg. St. Maurice, 53 (48).
Melitaea athalia, Salève, 33. Lavey, 46.
Melitaea phaebe, Arolla, 44 (38). Martigny, 53.
Issoria lathonia, Montana, 48 (38). Tragacete, 60 (50).
Brenthis euphrosyne, Tinières, 40. Laquinthal, 50.
Brenthis daphne, Switzerland, 48. Martigny, 56.
Brenthis pales, Wengern Alp, 31. Gèdre, 46.
Argynnis cydippe (*adippe*), Swinley, 52 (52). ♀, Swinley, 67 (65).
Melanargia galathea, Eclépens, 42. Pallanza, 62.
Hipparchia semele, ♂, Continental, 50. ♀, Martigny, 68.
Epinephele jurtina, ♂, Swinley, 36. ♂, Tattone, Corsica, 52.
Ctenonympha pamphilus, St. Triphon, 23. Bg. St. Maurice, 40.
Pararge megera, ♂, Swinley, 40. ♀, Swinley, 50.
Loxia dorilis var. *subalpina*, Brigue, 28. Grindelwald, 36 (33).
Lycena arion, ♂, Bude, 34 (32). ♀, Villach, 52 (44).
Celastrina argiolus, ♀, Oxshott, 31 (25). ♀, Wicken, 36 (35).
Lycena euphemus, ♀, Carinthia, 32. ♀, Wolfsburg, 41.
Lycena iolas, ♂, Budapest, 38 (32). ♂, Budapest, 52 (44).
Cupido minimus, ♀, Simplon, 22. ♀, Grindelwald, 30 (26).
Agriades thetis, ♂, Eastbourne, 30. ♂, St. Triphon, 38.
Polyommatus icarus, ♂, Piggott's Hole, 23. ♀, Piggott's Hole, 36.
" " ♀, Mickleham, 25. ♂, Horsley, 38.
Aricia medon, ♂, Mickleham, 25. ♀, Brugnasco, 34.
Plebeius argus, ♂, Digne, 22. ♂, Digne, 36.
" " ♀, Oxshott, 22 (23). ♀, Digne, 29 (32).
Scolitantides baton, ♂, Continental, 22. ♂, Corsica, 32.
Hesperia malvae, ♂, Horsley, 22. ♀, Holmwood, 26.
Nisoniades tages, ♂, Simplon, 26. ♀, Piggott's Hole, 32.

APRIL 8th, 1916.

FIELD MEETING AT COBHAM AND OXSHOTT.

Leader.—W. J. KAYE, F.E.S.

This Field Meeting was held in lovely weather. Train was taken

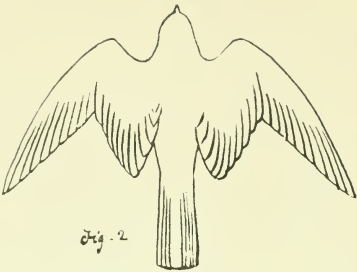


Fig. 2

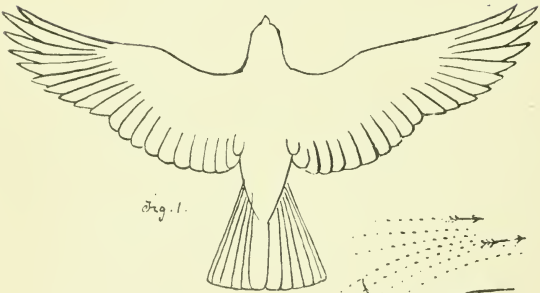


Fig. 1.

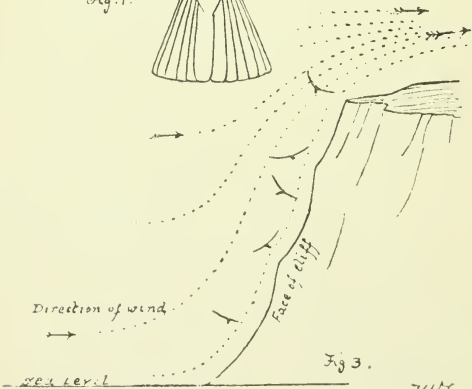


Fig 3.

J.W.F.

Flight of Birds. Figs 1-3

to Cobham, and from thence the walk was to the Black Pond at Esher, and back to the train at Oxshott Station. I have no records of captures except that of *Semioscopus acellanella*. Tea was obtained at Packham's, just outside Surbiton Station, at which about a dozen members and friends sat down, all having enjoyed the early ramble in full sunshine.

APRIL 13th, 1916.

Mr. F. W. Frohawk gave a lecture on the "Flight of Birds," exhibiting a number of preserved skins in illustration of his remarks.

The following is a short resumé:—

"Before referring to the different modes of flight, allusion may be made to the difference of the wing area in comparison to the weights of birds, which vary considerably in this respect, consequently the strength and bulk of the pectoral muscles vary accordingly to correspond with the different types of birds. The formation of the wings likewise varies enormously in different species; in some, like the falcon and swift, they are long, narrow, and pointed, while in others like the pheasant and partridge the wings are short and rounded. But it is not birds with the greatest wing area which are always possessed with the greatest speed, as very frequently we find the reverse; for instance, heavily built birds with conspicuously small wings, like guillemots, divers, and ducks, are capable of attaining tremendous speed; the teal has been proved to fly at the enormous velocity of 150 miles an hour. On the other hand gulls, terns, and owls, with great wing area, although adapted for long sustained flight, are comparatively slow. The following table will convey an idea of the comparative weight with the wing area in certain species:—

					lb. oz.
Guillemot	...	...	expanse	24 $\frac{3}{4}$ in. ...	weight 1 13
Puffin	...	...	"	21 $\frac{3}{4}$ in. ...	" 13
Mallard	...	...	"	35 $\frac{1}{2}$ in. ...	" 3 $\frac{1}{2}$
Great Black-back Gull	...	...	"	63 in. ...	" 2 14
Common Tern	...	...	"	31 in. ...	" 4
Pheasant ♂	...	...	"	31 $\frac{3}{4}$ in. ...	" 2 12 $\frac{1}{4}$
Red-legged Partridge	...	...	"	21 in. ...	" 1 1
Short-eared Owl...	...	...	"	39 in. ...	" 13

As will be seen by the above, a great black-back gull and a

pheasant weigh almost the same, yet the former has an expanse double that of the latter, and a common tern weighing only 4oz. has an expanse about equal to a pheasant. The guillemot has the smallest wings, in comparison to its size, than any other British bird, but its flight is one of the swiftest in a straight steady course by great rapidity of wing strokes.

Birds have three principal modes of flight—1, gliding or skimming; 2, sailing or soaring; 3, active strokes of the wing.

Gliding.—When a bird has acquired a certain velocity it ceases to beat its wings, and with them and the tail extended it glides along in a forward motion either horizontal, ascending or descending. This is a common form of flight with buzzards, gulls and other large birds of ample wing area. See diagram fig. 1, pl. ii.

A falcon swooping down on its quarry descends with extraordinary velocity by means of its wing being only partly expanded (fig. 2), should it miss its mark striking at its prey it is enabled by sudden expansion of its wings and elevating its head to instantly glide upwards, which action is due to the impetus and formation of its wings. Consequently a bird with its wing brought forward (fig. 1) glides slowly, and one with its wings only partly expanded (fig. 2) glides with great rapidity. It can alter its course when gliding by slightly turning its head to one side or by partly closing one wing, the bird then turns to the same side.

Soaring.—Typical soaring birds are eagles, buzzards, falcons, owls, gulls, and crows. Most soaring species are of large size and possess great wing area. But it is only when a certain amount of wind prevails that soaring is possible and it is perfected during a strong wind. In a calm it is not possible. Thus in a wind, after an elevated position is attained by wing strokes, it can then sustain itself on outstretched wing, and without further apparent motion of its wings describe circles and curves which enables it to glide both up and down the wind. One of the finest examples of such flight is performed by a soaring buzzard, which is also capable of ascending to a very great height by a series of a few wing strokes at regular intervals; between each series it sails round and round for about three times forming a perfect spiral figure, by this means I have watched them soar upwards until appearing as a tiny black speck in the sky. Gulls may frequently be observed soaring to and fro and up and down in front of a cliff, which they appear to delight in doing when a strong wind is blowing direct against a cliff and is diverted upwards, in this strong current of ascending air

they allow themselves to be carried to the top and above in the current as far as it ascends, and then fly down to the base of the cliff to again be carried to the summit with their wings motionless, fig. 3."

Mr. Sperring exhibited an extremely interesting and unique living aberration of *Spilosoma mendica* bred by him from "larvæ taken wild." It was a male with a moderately wide margin around the forewings of the usual dark male coloration, the whole of the central area being of a much lighter smoky tint with considerable scattered and definite dark spotting as in the female. No one in the meeting had met with such an aberration in this species.

Mr. Stanley Edwards exhibited *Papilio telearchus* with its mimic *Euplœa midamus*, *Papilio rhetenor* with its mimic the moth, *Epicopeia polydora*, with *Papilio bootes* and *P. dasarada*, and communicated the following note:—

"The genus *Epicopeia* consists of about 10 species, which are found in Java, India, China, and Japan. The larvæ of these moths, according to Mr. Dudgeon, are covered with long processes of snow-white efflorescence, like wax, exuding from the skin, and mimic a colony of the larvæ of a Homopteron. Hampson states that the imagines mimic the Papilios of the *philoxenus* group. The antennæ are bipectinate and the frenulum rudimentary. The genus is placed by Dr. Sharp ("Insecta," Cambridge) next to the *Uraniidæ*."

Mr. Newman exhibited a living example of *Pyrameis atalanta* bred in September of last year, 1915. It was kept alive in a warmed room and fed at intervals throughout the winter. It seemed quite perfect and in no way damaged by its long vigil.

Mr. Frohawk exhibited a twig from Addington upon which was fastened the three last segments of a chrysalis, which had been fully identified as the remains of a pupa of *Colias edusa*.

Mr. R. Adkin made some remarks on the season at Eastbourne. He had met with *Sesia stellatarum*, *Aglais urticae* in some number, and *Celastrina argiolus*.

Mr. Frohawk said that he was doubtful if *S. stellatarum* was a true hibernator, although, undoubtedly, it did at times live through the winter in this country. He gave from July to April as the period for hibernation of *A. urticae*, while in Surrey he was accustomed to consider it as from October to April. He had seen *Vanessa io* in January in Cornwall flying over the snow, and had also noted two *Gonepteryx rhamni* on the Friday after the recent heavy snow.

Mr. Platt Barrett said that he had evidence of *S. stellatarum* hibernating in a large building at Margate, which was heated with hot water. When the species had been common he always expected to find a few hibernate in this way. In Sicily they occurred throughout the year.

The Rev. G. Wheeler said that *S. stellatarum* hibernated in Switzerland usually from November to March. He had seen *G. rhamni* flying over the snow there, but probably it had come up from the lower elevations which were already clear of snow.

Mr. Brooks reported that he had seen *Pieris brassicæ* on April 2nd.

APRIL 27th, 1916.

The evening was spent in looking at objects under the microscopes which had been arranged under the supervision of Mr. West, of Ashted.

Mr. West showed the wonderful Zoophyte *Meliceria ringens* in its beautiful tubular structure, a number of Diatoms *in situ* on specimens of Coralline, a living *Daphne pulex*, the so-called "Water-flea," mounted to show the pulsation of its "heart," and various species of Desmid, under his own and Mr. Turner's microscopes.

Mr. Dunster exhibited slides of Diatoms *in situ* on sea-weed, and the very young larvæ of the Spiny Lobster.

Mr. A. W. Dennis exhibited the eggs of the Dipteron *Anthomyia plurialis*, and the Mycetozoon *Didymium effusum*.

Mr. A. W. Dods showed the foot of a bird-catching spider, *Mygale*.

Mr. Ashby exhibited sections of the Hart's-tongue Fern, *Scolopendrium*.

Mr. H. Moore exhibited the head of a Tsetse Fly, *Glossina tachmoides*, the foot of the same species, a section of the stem of *Hippuris vulgaris*, the Mare's-tail, and a marine zoophyte with its tentacles expanded.

Mr. Edwards exhibited slides showing the disease, Rickets, in a child, the *Trichina* worm in muscle, *Variola* in skin, a species of *Podura*, and the nest of a small spider.

Mr. R. Adkin exhibited the larval hairs of *Nola albulalis*, and of *Orgyia antiqua*, ♂ and ♀ antennæ of *Saturnia paronia* (*carpini*), and the genitalia of *Ptycholoma lecheana*.

Mr. W. J. Ashdown exhibited Coleoptera, Hemiptera, etc., in-

cluding a specimen of *Pogonochærus hispidulus*, Piller (= *bidentatus*, Thoms.) taken at the Society's field meeting at Oxshott on April 8th, also *Molorchus nubellatarum*, *Microrrhagus pygmaeus*, *Ledra aurita* (and larvæ), *Trichopsylla walkeri*, etc., together with some crystals under polarised light.

Mr. F. G. Wood, a visitor, showed a number of Chemical Crystals under Polarised Light, including Asparagine, Salacine, a series of Platino-cyanides, and Hippuric acid, many of them very beautiful in the colour and arrangement of their particles.

MAY 11th, 1916.

THE EXHIBITION OF "OTHER ORDERS."

Mr. Ashdown exhibited three boxes containing varieties and aberrations of *Coccinellidæ*, comprising:—

1. About 20 different forms of *Adalia bipunctata*.
2. A very large number of *Coccinella 10-punctata* showing a great range of aberration, from spotless examples to specimens with coalesced spots and blotches, and also several dwarf and some very large forms.
3. Many forms of *Coccinella hieroglyphica* showing a similarly large range of aberration from spotless forms to a specimen in which the thorax was entirely black.

Mr. R. Adkin exhibited a weathered flint that he had found on the Downs near Eastbourne, and which so closely resembled a mushroom in general appearance that, when in an upright position one might easily have been tempted to gather it as such.

Mr. West (Ashtead) exhibited the living larva of a stag-beetle, *Lucanus cervus*.

Mr. West (Greenwich) exhibited five drawers of his collection of Coleoptera, including his very fine series of *Coccinellidæ*, *Chrysomelidæ*, *Endomychidæ*, *Bruchidæ*, *Scarabaidæ*, *Lucanidæ*, etc. Among the *Lucanidæ* was a fine series of *Lucanus cervus*, the stag-beetle, showing extremes of size, the largest ♂ measuring from the point of the antlers to the tip of the elytra just $3\frac{1}{2}$ inches, while the smaller measured $1\frac{3}{8}$ inches.

As a contrast some of the *Trichopterygidae* were exhibited to show the difference between our largest and smallest Coleoptera, including *Pteryx suturalis*, Math., $\frac{3}{4}$ – $\frac{4}{5}$ mm.; *Ptinella denticollis*, Fairm.,

$\frac{3}{4}$ mm.; *Ptilium exaratum*, All., $\frac{5}{8}$ - $\frac{3}{4}$ mm.; *Actidium coarctatum*, Hal., $\frac{1}{2}$ - $\frac{5}{8}$ mm., etc.

Mr. West also called attention to the Society's collections, eight drawers of which he had placed upon the benches for inspection, including the Diptera, the Neuroptera, the Orthoptera, the Hymenoptera, and the Hemiptera.

Mr. Pierson exhibited a cocoon of *Samia cecropia*, which he had received from Brooklyn, U.S.A., where it had been collected. It was cut open and contained a mass of cocoons of a Hymenopterous parasite.

Mr. Hy. J. Turner exhibited three pocket boxes containing specimens of several groups of the Rhynchota and communicated the following notes:—

“In the first box are a number of species of the two families *Pentatomidæ* and *Scutelleridæ*. The species of the latter family may easily be separated from those of the former by the fact that the thoracic shield or scutellum is extremely large and usually covers nearly the whole of the abdomen, the wings being concealed beneath it as they are in the Coleoptera under the elytra.

“In the *Pentatomidæ* the scutellum is also large, usually more or less regularly triangular in shape and attenuated posteriorly, the apex reaching to about the base of the membrane of the wings when folded in repose. The head and prothorax together form a regular triangle.

“These two families belong to the section of the Rhynchota known as the Heteroptera, in which the forewings are partly membranous and partly coriaceous.

“In the second box are a few species of the *Flatina* group of the *Fulgoridæ*, or lantern-flies. They are remarkable for their resemblance to the Lepidoptera, but of course their mouth structure at once separates them.

“The third box contains, on the left side, several species of the *Tettigoniæ*, a group of leaf-hoppers, on the right side several species of leaf-hoppers of the *Jassiniæ* group, and in the centre a few immature forms of Rhynchota species. Many immature forms in this order are extremely brilliant in coloration, but this is very evanescent, and usually disappears in all preserved specimens.

“The species shown in the last two boxes belong to the section Homoptera in which the wings are wholly membranous and not divided into two parts, a membranous and a coriaceous, as in the Heteroptera.”

Dr. Chapman exhibited and communicated the following note:—

"1. A male and female of *Trichiosoma tibialis*, Stephens = *retuleta*, Klug, which Mr. Morice tells me is the correct name of this, our common hawthorn species. I also show two eggs laid beneath the upper cuticle of hawthorn leaves. With a lens and a light behind the leaves it should be possible even in the artificial light of our meeting room, to see the brown-black eyespots of the developing larvæ, and their weird to and fro movements at short intervals.

"2. Specimens of *Psila rosae*, bred from parsnip. This is the 'carrot-fly,' a well-known pest of carrots and to some degree of parsnips. It was interesting to note that a bit of the inside of a parsnip put on damp sand to rear the larva of the fly, developed roots below and leaves above. The roots arise from brownish callosities, whilst similar but greenish callosities have arisen where leaves developed.

"3. Specimens of the somewhat rare fly *Pegomyia hyoscyania*, (its parasite and puparia), bred from *Datura stramonium*. Mr. Collin gives me the name and says he has only two specimens, females, that were bred from *Atropa belladonna*—named from being bred from *Hyoscyamus*—all belonging to the *atropa* branch of the *Solanaceæ* (night-shades)—If it attacked potatoes (belonging to the *Solanaceæ* branch) it would necessarily be a much commoner insect than it appears to be."

Mr. R. A. R. Priske exhibited the shells of a number of species of British Water Mollusca, including *Limnaea auricularia* from Uxbridge and *L. stagnalis* from Staines, both species particularly well developed and not worn; *Vivipara contecta* from Staines, unusually large and perfect, and *V. vivipara* from Cheshunt; *Anodonta cygnea* from West Drayton and *A. anatina* from Staines; *Unio tumidus* and *U. pictorum* from Shepperton; a very variable series of *Spharium corneum* from Uxbridge; and *S. rivicola* from W. Drayton.

Mr. S. R. Ashby exhibited several drawers of his finely mounted British Coleoptera comprising the Ground beetles of the genera *Harpalus* and *Pterostichus*, the Water beetles of the genera *Agabus* and *Rhantus*, the *Lucanidæ*, *Scarabæidæ*, *Buprestidæ*, *Elateridæ*, etc., and the genera *Otiorrhynchus*, *Polydrusus* and *Phyllobius*.

Mr. H. Moore exhibited a number of cockroaches and earwigs taken alive in a city warehouse, in merchandise from Japan, in April, 1916; the nests of a Weaver-bird (*Ploceidæ*) from Simons Bay, S. Africa; and the eggs of the Tropic-bird, *Pharthon*

flavirostris. It was remarked that one of the cockroaches was an example of *Blatta americana*.

Mr. Stanley Edwards exhibited several boxes of Exotic Insects :

1. A number of species of "stick insects," *Phasmidae* and their allies, including the beautiful *Diura violescens*, and the Bornean *Heteropterus grayi*, which was not a true Phasmid. One of the phasmids measured more than 10 inches from its head to the extremity of its abdomen, viz., *Phryganistria sarmentosa* from Queensland.

2. A box of *Mantida* mainly from the Malay region.

3. A box of large and conspicuous Coleoptera mostly from Borneo, and including the curious "fiddle" beetle *Mormolyce phyllodes*.

4. A box of Burmese Coleoptera including some beautiful *Buprestida* and several species of the large and eccentric shaped *Sagra* genus.

Mr. Frohawk exhibited a considerable number of sketches from life in colour of the heads of various specimens of Orang and Chimpanzee, which had been in the Zoological Society's Gardens during the past twenty years, and gave an interesting account of the animals sketched.

He said that the first sketch was of an Orang received when about 10 years old and measured at that time two feet six inches high, had an arm expanse of 6 feet, a span of 8 inches between finger and thumb of the hand, and the mid finger with a circumference of 4 inches. Another sketch showed the head of the same animal at the age of 21 years. It now had an arm expanse of between 8 and 9 feet, could span some 12 inches and had developed large cheek collosities on the face. These last had begun to show when the animal was about 16 years old and had been supposed to be a sign of adult development, but recently it had been found from a series of investigations made in Paris that this development was a sign of senility. Mr. Frohawk referred to another sketch and remarked that the hair of that example was extraordinarily long, reaching 2 feet in some parts of the body. A sketch of the head of a Mandril was referred to; the long tusks resembled those of a lion and were knife-edged on the inner side; the animal was naturally very savage. He then remarked on the characters and gave personal reminiscences of the various chimpanzees whose portraits were shown, pointed out the peculiarities of the different races, and referred to one animal which perfectly well understood the numerals

1 up to 6, and was in every way most intelligent. In the discussion which ensued it was stated that many oranges drink their own urine. Mr. Frohawk stated that in dealing with these animals it was necessary to speak softly, but with decision, and to show no fear.

MAY 20th, 1916.

FIELD MEETING AT OCKHAM AND WISLEY.

Leader.—W. J. KAYE, F.E.S.

A Field Meeting was held on May 20th to Ockham and Wisley. The morning party left Waterloo by the 9.20 and arrived at Effingham Junction about 10.30, and, from the collecting point of view, all the principal captures were made in the morning. The weather was fine and dry and before lunch a ramble was made in the covers near the station. These consist largely of oak, and the trees, owing to the tremendous denudation of the foliage by the larvæ of chiefly *Tortrix viridana* and *Hibernia defoliaria*, presented the appearance of midwinter instead of late spring. In places quite curtains of white silk were to be observed formed by the strands by which these larvæ lowered themselves. The denudation has been noticed all over Surrey and the adjacent parts of Hampshire. It was left to the afternoon party to largely swell the list of the plants observed, and also of the Odonata which were noted at Wisley pond. Tea was to have been taken at the "Black Swan," but owing to structural alterations, at the last minute it was found necessary to go to the "Hut" Hotel on the Portsmouth road. Notwithstanding the short notice of less than three hours a most comfortable and enjoyable tea was provided at 5.30. A long detour was made after the refreshment was over by way of Ockham, the route lying along the Portsmouth Road as far as the "no motors" road on the left, and turning left again in Ockham village. The distance proved longer than anticipated, and some very sharp walking was called for to catch the train. Some elected to come back by a later train and to sample the rewards for dusking. The following insects and plants were among those observed during the day:—

LEPIDOPTERA.—*Gonepteryx rhamni*, *Pieris brassicae*, *P. rapae*, *P. napi* in some numbers, *Euchloë cardamines* a few, *Vanessa io*, *Brenthis euphrosyne* just coming out, *Hesperia malvæ* very common, *Nisoniades tages*, *Hypocrita jacobææ*, *Diaphora mendica*, *Mamestra*

(*Hadena*) *genista*, *Heliaca tenebrata* a few, *Venilia macularia*, *Opisthograptis* (*Rumia*) *luteolata*, *Tephrosia crepuscularia* (*bimaculata*), *T. punctulata*, *T. consonaria*, *Cabera pusaria*, *Macaria liturata*, *Lozogramma petrarica*, *Ematurga atomaria*, *Eupithecia vulgata* (in the train), *E. exiguata*, *E. abbreviata*, *Lobophora halterata* (*hexapterata*), *Thera variata*, *Coremia unidentaria*, *C. designata* (*propugnata*), *Eustroma silaceata*, *Xanthorhoe fluctuata*, *Gelechia ericetella*, *Micropteryx calthella*, etc.

COLEOPTERA :—*Cicindela sylvatica* locally in numbers.

ODONATA :—*Libellula depressa* and *Agrion puella*.

PLANTS, mostly in flower :—*Caltha palustris*, *Cardamine pratensis*, *Nasturtium officinale*, *Lychnis diurna*, *Arenaria trinervis*, *Stellaria holostea*, *Geranium robertianum*, *Rhamnus frangula*, *Genista anglica*, *Orobis* (*Lathyrus*) *macrorrhizus*, *Vicia sepium*, *V. sativa*, *Geum urbanum*, *Crataegus oxyacantha*, *Heracleum sphondylium*, *Anthriscus sylvestris*, *Veronica chamaedrys*, *V. beccabunga*, *Pedicularis sylvatica* (in great masses), *Scrophularia aquatica*, *Ajuga reptans* in quantity, *Listera orata*, *Arum maculatum*, *Eriophorum polystachyon*, *Anthoxanthum odoratum*, *Melica uniflora*, *Asplenium rutamuraria*, *Ophioglossum vulgatum*, *Equisetum limosum*, etc., etc.

Mr. Turner subsequently reported that he had bred a quantity of *Rhyacinia* (*Retinia*) *pinivora* from the shoots of *Pinus sylvestris* which he gathered behind the smaller pond and that he had taken the other Tortrices, *Epippiphora cirsiana*, *Pædisca ratzburghiana*, and *Phocopteryx unguicella*.

MAY 25th, 1917.

Mr. H. Moore exhibited specimens of *Catocala palaecyama* from the Alleghany Mts. and *C. nupta* from the Gironde, France.

Mr. A. E. Gibbs exhibited specimens of the *Catocalinae* group of the *Noctuidæ*, including :—

1. New world species :

Euparthenos nubilus, Hb., from Arizona : range from Canada to the Southern States.

Ephesia desdemona, H. Edw., from Arizona : range only Arizona.

2. Old world species :

Catocala fracini, L., a British specimen bred by Mr. C. E. Seaborne, of Watcombe Hall, Devon, from an ovum laid by a ♀ caught near Brighton in 1896.

C. promissa, Esp., a dwarf example from the New Forest.

C. elocata, Esp., Italy: range Central and South Europe and Western Asia.

Mormonia dilecta, Hb., Corsica, taken by himself, at rest on a tree at Bocognano, on July 27th, 1911. A species allied to *C. sponsa*. Range S. Europe, N. Africa, and Asia Minor.

Mr. Gibbs also showed an aberration of *Pararge megera* taken by Dr. R. C. L. Perkins at Brixham, in September, 1915. It was similar to a specimen figured by the late C. G. Barrett ("Lep. Brit. Isles," vol. i., pl. 32.) in which the space between the two central transverse lines of the forewing is filled up with dark brown. The specimen is a female and possibly belongs to a third brood.

Mr. W. J. Ashdown exhibited a further series of aberrations of *Adalia obliterata*, L., including some forms with strongly accentuated markings, and one specimen with black elytra, and also a black aberration of *A. bipunctata*.

Mr. B. S. Curwen exhibited a series of the forms of *Ctenonympha pamphilus* from the Mediterranean seaboard and islands, including well marked var. *lyllus* the southern summer form, ab. *marginata* with very broad dark distal margin on all wings, and var. *thyrsides* the large form with light straw-coloured ground with well emphasised marking both upper and undersides.

Dr. T. A. Chapman exhibited leaves of Hawthorn and Birch, showing how *Trichiosoma tibialis* (the large Hawthorn sawfly), laid her eggs quite close to the margin of the leaf of *Crataegus*, and that *Cimber sylvarum* (our largest British sawfly) in the birch leaf laid her eggs nearly a quarter of an inch from the margin. One might suppose the *Trichiosoma* was actually trying to enter the leaf at the actual margin. This species lays her eggs almost always on the upperside of the leaf, the *Cimber* apparently invariably on the underside. The movements of both species seemed slow, careless, and lumbering, and seemed to have no particular attitude to enable them to determine the point of the leaf they desired, which was nevertheless always secured with much accuracy. In reply to a question by the President, it was explained that the eggs are laid in a pocket made by the ♀ with her "saw," beneath the cuticle of the side of the leaf affected; on hatching, the larvæ are not miners, but emerge on to the surface of the leaf and disport themselves much as Lepidopterous larvæ do.

Mr. Hy. J. Turner exhibited the following species of the genus *Catocala* and read notes on the exhibit.

- British : *C. sponsa*, *C. nupta*, *C. promissa*, and an aberration with cream instead of crimson hindwings.
- Continental : *C. elocata*, *C. electa*, *C. pacta*, *C. dilecta*, *C. puerpera*,
C. fraxini.
C. diversa, *C. paranympa* (*fulminea*).
- American : *C. concumbens*, *C. cara*.
C. similis (*aholah*) and *C. chelidonia*.

"I am exhibiting a few species of the conspicuous genus *Catocala*, popularly known as the 'red underwings,' although not all of them are red. In fact, of the genus in its old and widest sense not only are there species with red underwings, but also species with blue, yellow, very dark brown, and as aberrations even white lower wings.

"Three species, as you are no doubt all aware, are indigenous in Britain, *C. nupta* (a common species), *C. sponsa* and *C. promissa* (both more local), while a fourth *C. fraxini* is a doubtful native.

"The characteristic habits of the British species are pretty generally those of the whole, a love of sweets and the custom to rest on the bark of trees to which the arrangement and colour of the markings on the forewings have an extraordinary resemblance. This resemblance extends even to the larvæ of some species, most of which feed upon forest trees and have the habit of resting lengthwise on the branches, on which their somewhat flattened form, their mottled grey and variegated bark-like colour, and the irregularly carunculated sides with hairs directed downwards, render them most inconspicuous. I recall to mind that on more than one occasion I have found the imago sitting on a fence in the brilliant sunshine, but still admirably protected by its colour and marking. The brilliant hindwings are always covered when the moths are at rest.

"Representatives of our three indigenous species are in the box I exhibit. There is a specimen minus a head of what I take to be an aberration of *C. promissa*. It came from one of the late Mr. Tutt's duplicate boxes and I think that it must have been under his strong suspicion, or it would have been in his cabinet.

"Hoffmann in '*Gross-Schmetterlinge Europas*,' ed., ii. (1894), gives the following 22 species as the representatives of the genus *Catocala* in Europe:—*C. fraxini*, L., *C. elocata*, Esp., *C. adultera*, Mén., *C. nupta*, L., *C. dilecta*, Hb., *C. sponsa*, L., *C. promissa*, Esp., *C. conjuncta*, Esp., *C. lupina*, H.S., *C. pacta*, L., *C. optata*, God., *C. electa*, Bkh., *C. puerpera*, Giorna, *C. neonympha*, Esp., *C. nymphæa*,

Esp., *C. paranymphea*, L., *C. hymenaea*, L., *C. conversa*, Esp., *C. eutychea*, Tr., *C. diversa*, Hb.G., *C. disjuncta*, Hb.G., and *C. nymphagoga*, Esp. Several of these I am exhibiting mainly obtained from the duplicate boxes of the late J. W. Tutt.

"Staudinger in 1901 in his 'Catalog. Pal. Grs.' ed., iii., expands this number into 53 species for the whole of the Palearctic area, but exactly agrees as to those which are only found in the European countries. His nomenclature is the same with the one exception that for *paranymphea*, of L., he substitutes the name *fulminea*, Scop., which has prior claim."

"In volume iii. of Seitz Palearctic section of 'Gross. Schm.' (1914), the sectional editor, the late W. Warren, divides the 87 species he recognises into three genera. In *Mormonia* he places three species, including our British *C. sponsa*; in *Catocala* (*sen. strict.*) he includes 46 species, among which are found the British remaining representatives *C. nupta*, *C. promissa* and *C. fraxini*; in the third, *Ephesia*, are 33 somewhat smaller species most of which have yellow hindwings.

"Both the genera *Mormonia* and *Ephesia* had been founded by Hübner many years before, but were seldom used until restituted by modern research and study.

"The basis of this separation into lesser genera is mainly the structure of the hind legs. In *Mormonia* and *Catocala* the hind tibiae are furnished with spines, while in *Ephesia* the hind tibiae have no spines. To separate *Mormonia* from *Catocala*, the species in the former have spines along the whole length of the tibiae, while in the true *Catocala* these spines only exist in the space between the two pairs of tibial spurs. This latter distinction may be found useful for us to separate any doubtful examples of *C. promissa* and *C. sponsa*.

"America however is the great home of the 'red underwing.' On consulting Dyar's 'Cat. of N. American Lep.' (1902), I find no less than 104 species in the genus *Catocala*, but I do not find that any one species is common to both continents. A perusal of American entomological magazines shews a considerable number of entomologists who specialise in these insects alone.

"In N. America the usual way of hunting for *Catocalas* is to go through the woodland, gently rattling the leaves with a long switch and watching closely where the disturbed moth settles. As they are large in size and do not as a rule go far this is not a difficult task. The large trees in their known habitats are care-

fully examined for all doubtful V marks, which usually indicate a resting moth. In some localities it is said to be possible to capture more than a dozen species of this genus in one day's ramble. This must be exciting. I have seen a record from New York State announcing 39 species in one season's collecting in the writer's neighbourhood.

"Coming to our latest authority, Hampson, in 'Cat. Lep. Phal. Brit. Mus., *Noctuidæ*,' (1913), we find that he includes 199 species in the list of the whole world and that he adopts two other genera which have been made from the original *Catocala*, viz., *Enparthenos*, Grote, with one species and *Catabapta*, Hulst, with 22 species. A number of species with blackish brown underwings are included in the latter genus. Figures (coloured) of many American species can be seen in Holland's 'Moth Book,' a copy of which is in our Library.

"A writer in the 'Ent. News' (U.S.A.), states that he has found *C. concumbens*, a species of which I exhibit several specimens, to be addicted to settling on telegraph posts in numbers, and on one occasion he took no less than ten specimens from one pole. He makes the curious observation that when a lot of new poles were put up beside old ones, the moths never on any occasion were to be found on the newer lighter coloured poles where they would have been easily seen. The writer calls this a selective faculty on the part of the insect, but may it not be that before the more or less sporadic visits of the entomologist, who was not as keen as the avian hunters for their meals, all such conspicuously situated moths had been thoroughly removed by force. In a subsequent year the same writer found that when the new poles were weather-worn the moths rested on them as they did on the old original poles, and were equally protected by their resemblance."

In the discussion which ensued Mr. Frohawk remarked that near the Zoological Gardens, Regent's Park, several supposed *C. nupta* were noticed on trunks of trees, and a pin was thrust through the thorax of what was considered the finest specimen. On examination it was found to be an example of *C. fraxini*. He also referred to an example of *C. nupta* captured by the late Mr. Winkley in 1892, in which the usual red colour of the hindwings was replaced by a very delicate warm brown, while a purplish glow covered the whole surface of the wings.

Mr. A. E. Gibbs recalled an instance in which *C. nupta* had

remained all day at rest on an oak fence skirting a public path along which people were continually passing.

Dr. Chapman in referring to the flight by day said that a species he had met with on the uplands of Spain, *C. conversa*, one of the "yellow" underwings, was accustomed to fly in considerable numbers in daylight.

Mr. Wolley Dod said that he was only acquainted with about four species in Alberta and that but few species occurred in Canada, the Eastern States of America were the great home of the genus, and specialists had given big prices for many of the rarer forms.

Several members had met with *C. nupta* resting in the sun-light.

On behalf of Mr. P. J. Barraud, Mr. Gibbs exhibited several specimens from Salonika and contributed the following note:—

"Pte. P. J. Barraud, R.A.M.C., has sent me home from Lembet Camp, Salonika, where the Ambulance to which he is attached is stationed, a skin of a lizard, which I think I am right in calling *Agama stellis*, L. At any rate there are only two species of *Agama* found in Europe and the other one is confined so far as our continent is concerned to a limited area in the Caucasus. The range of this species is S.E. Europe, Asia Minor, Syria, N. Arabia and Egypt. Pte. Barraud says the lizard is common among the rocks and there are many smaller green lizards and numbers of tortoises. Lembet Camp is about 4 miles N. of Salonika and about 400 ft. above sea level.

"I also exhibit a large centipede sent home by Mr. Barraud from the same place. I believe it to be the S. European species known as *Scolopendra obscura*, this of course is not an insect, it belongs to class Myriopoda, which includes the centipedes and millipedes. In the Eastern Counties the centipede is called 'Forty-legs,' which is nearer the truth than its better-known name of centipede, for I believe our common English species of *Scolopendra* has 21 legs on each side. The examples I show you have 19 pairs of legs. It is said by biblical scholars to be the creature spoken of in Leviticus, xi., 30, as the 'mole' in the list of 'creeping things that creep upon the earth, and which are unclean.'"

JUNE 8th, 1916.

Mr. W. J. Ashdown exhibited male and female specimens of the Coleopteron *Cryptocephalus coryli* to show the sexual dimorphism.

They were taken in Surrey. Also a male example of the Dipteron *Ctenophora flareolata* (?) belonging to the *Tipulidæ*, from Surrey.

Mr. H. Main exhibited (1) a small cockroach found among bananas, the colour of which it closely resembled. It was supposed to be a species of *Panchlora*. (2) Male and female of the burying beetle *Necrophorus humator* covered with *Acari*. At first there were only a few *Acari* on each. When a piece of meat was placed in the box the *Acari* left the beetles and attached themselves to the meat. Now they had again settled on the beetles, and since their number had increased so as to almost completely cover them, the *Acari* must have bred while on the meat. It was asked what use the *Acari* were to the Coleopteron. Were they simply parasites, or were they scavengers, or did they use the beetles merely as means of transport? And (3) nearly full fed larvæ of the "firefly" *Luciola italica* bred from ova laid in 1914. He thought that these larvæ would possibly not produce imagines until 1917, thus passing three winters in their pre-imaginal stages.

Mr. West reported the nest of a Tit in an iron pipe, which was lying in an oblique position against a fence, and Mr. Platt Barrett called attention to the almost complete denudation of the foliage of the oaks in the London District by the attacks of the larvæ of *Tortrix viridana* and other species.

JUNE 22nd, 1916.

Mr. Stanley Edwards exhibited a specimen of the fungus *Polyporus sulphureus* found on an oak trunk at Dulwich by Mr. C. W. Colthrup, and read the following note:—

"Plant very polymorphous in its shape, and unequal in size, composed of a number of mostly imbricated pilei, more or less grown together, so as to form one mass from which the rounded and lobed margins of the pilei project in a tiled manner or shoot out into various excrescences, or even somewhat cylindrical, simple or divided branches, the whole sometimes attaining two or three feet in breadth. Colour yellowish, orange, red, or a bright union of these hues, fading in age, the spores always of a fine sulphur tint when old, dry and friable, never coriaceous."

Mr. Edwards also exhibited several teeth of a shark, *Odontaspis cuspidata*, found at Eltham, Kent, in the Woolwich Beds of the Lower Eocene. This shark was of moderate size, chiefly inhabiting

the Atlantic, but found also in the Mediterranean and the Southern Pacific.

Dr. Robertson exhibited an abnormally marked larva of the Geometer *Cleora jubata* (*glabraria*) from the New Forest. Most of the usually lighter areas were suffused with the deep black colour so that the larva seemed almost wholly black.

Mr. Priske exhibited a short series of the very rare British beetle *Copris lunaris*, and pointed out the sexual dimorphism in the development of the frontal horn, referring at the same time to the fact that the smallest males can scarcely be distinguished from the well developed females.

Dr. Chapman exhibited the larva of the Sawfly, *Cimber sylvarum*, a large species that feeds on birch, and stated that the ova were laid by a virgin female and should all produce males.

Mr. F. B. Carr exhibited a spider he had found lurking for prey in flowers in the Wye Valley recently, and stated he had met with the following species in that neighbourhood. *Leptosia sinapis*, *Chattendenia w-album*, *Ennychia octomaculata*, *Perinephele lancealis*, *Brenthis euphrosyne*, *B. selene*, *Asthena blomeri*, *Abraxas sylvata* (*ulnata*), *Cymatophora fluctuosa*, *Eulype hastata*, etc.

Mr. A. Sich exhibited three specimens of *Argyresthia brockeella*, Hüb., showing the type form, the aberration *aurivittella*, Haworth, and an intermediate form. He also showed a cocoon of *Tortrix viridana*, L., spun on a blade of grass, picked off a hedge bank at Kingsbury. The larva adapting its silk to the grass had spun a long narrow cocoon.

Mr. Hy. J. Turner exhibited 15 species of *Pyraustina* brought from Sierra Leone by Mr. Bacot. Most of them were notable as being species of very extensive geographical distribution. They were all taken near Freetown. He contributed the following notes:—

“*Entephria cribrata* is found also in S. Africa, India, China, N. Guinea, etc.

“*Zinckenia fascialis* occurs in Texas, Jamaica, India, Formosa, Vladivostok, Bagdad, Abyssinia, Hawai, Australia, Fiji, etc.

“*Marasmia venilalis* comes from Mashonaland, Seychelles, Khasia Hills, Sumatra, New Guinea, etc.

“*Marasmia trapezalis* occurs in Uganda, Fiji, Singapore, Florida, S. Paulo, etc.

“*Syngamia floridalis* comes from Natal, Java, N. Hebrides, N. India, Formosa, etc.

"*Syngamia abruptalis* comes also from Nyassaland, Fiji, Formosa, Ceylon, etc.

"*Bocchoris inspersalis* is met with in the Nilghiris, N. China, Java, E. Africa, Nyassa, etc.

"*Nacoleia indicata* comes from N. Guinea, Andamans, Shanghai, E. Africa, Mexico, Paraguay, Brazil, Guatemala, etc.

"*Sylepta balteata* occurs in the Balkans, Brussa, Japan, China (interior), Burmah, Cameroons, Calcutta, etc.

"*Sylepta derogata* is also met with in the Cameroons, Transvaal, Formosa, Calcutta, Vladivostock, Tenasserim, W. China, N. Guinea, etc.

"*Glyphodes indica* is one of the most widely distributed insects of the world as it occurs in almost all tropical and subtropical areas.

"*Glyphodes sinuata* is perhaps the least distributed species in the box. It is mainly an African species. The British Museum has a specimen said to have come from the Nilghiris in India. It is a most beautiful species.

"*Sameodes cancellatus* has been met with in Nyassa, India, China, N. Guinea, etc.

"*Maruca testulalis* is another species with a wide distribution. Peru, Brazil, Mexico, Madeira, Calabar, Transvaal, W. China, Ichang, Singapore, Fiji, Sarawak, N. Guinea, etc.

"*Pachyzancla phaeopteralis* is still one more well distributed species coming from the Cameroons, E. Africa, Transvaal, Argentine, W. Indies, Costa Rica, St. Helena, Singapore, N. Guinea, Pekin, India, Pitcairn, etc.

"Many other species of this group show extreme geographical range and one would like to know what this indicates. Is it that the Pyrales or the *Pyraustinae* section of them are more primitive Lepidoptera? or is it that the distribution is the result of commercial intercommunication? One is inclined to think that the latter is a factor in the problem since so many of the places mentioned are on or near the coast, islands, and areas in direct communication with the sea. At the same time where a species occurs it is generally quite abundant and evidently has considerable constitutional strength and probably has been established for many years."

Mr. West (Greenwich) exhibited the specimens of the rare Coleopteron *Ancistronycha abdominalis* presented to the Society's Cabinet by Mr. G. B. Routledge.

JUNE 24th, 1916.

FIELD MEETING AT CLANDON.

Leader.—HY. J. TURNER F.E.S.

The meeting was not a very successful one as regards numbers, nor were the captures numerous or noteworthy. The day was somewhat showery but not until the last quarter of an hour before tea did the rain make itself really unpleasant.

The morning party left the train at Horsley station and went by devious paths to the sheep leas and thence to Netley Heath, at the upper end of which the road leading west was taken. About a mile further on an obscure path was taken to the right and thence by field and woodland to the isolated spot known as Ireland Farm. From this the rough slopes were traversed and a path taken skirting the woodland towards the eastern end of Merrow Downs, where the direct road leads up from Clandon Station. Here the afternoon party (2) met the earlier contingent and collecting continued by a somewhat different route until the rough slopes were again crossed. The rest of the time was spent in the rides or penetrating the almost solid masses of bush which cover the surroundings of the old race course. The rain now came in earnest and a hurried retreat was made to tea at the village of East Clandon.

Even on this dull day ten species of butterflies were noted. *Pieris napi*, *P. brassica*, *P. rapæ*, *Gonepteryx rhamni*, *Euchloë cardamines*, *Brenthis euphrosyne*, *Polyommatus icarus*, *Epinephle jurtina*, *Cæonympha pamphilus*, *Hesperia malvæ*, and *Angiades sylvanus*. Among the Geometers *Cabera pusaria*, *Semiothisa liturata*, *Timandra amata* (ria), *Tephrosia biundularia*, *Tephrosia consonaria*, *Venilia maculata*, *Thera obeliscata*, *Lozogramma petrvria*, *Melanippe procellata*, *Asthena luteolata*, *Bupalus piniaria*, *Craspedia ornata*, *Asthena candidata* and *Camptogramma bilineata* were reported. One pupa of *Zygana filipendulæ* was seen, a larva of *Arctia cæja* and imagines of *Hipocrita jacobæ* were found. From larvæ taken a short series of *Porritia galactodactyla* was subsequently bred. The Tortrices *Coccyx tædella*, *Ptycholoma leacheana*, *Catoptria hypericana*, *Dichrorampha petiverella*, and *D. plumbana* were reported.

Mr. W. J. Lucas very kindly furnished the following notes on the "other orders," plant-life, etc.

"Amongst the Dragonflies *Libellula depressa* was seen near Netley Heath, but escaped capture. The Homopteron, *Triecphora vulnerata*, was found near Newland's Corner. Neuroptera were:—*Panorpa communis*, one ♀; *P. germanica*, one ♀; *Micromus paganus*, one; *Hemerobius concinnus*, five; *Hemerobius quadrifasciatus*, one; *Chrysopa flavifrons*, one; *C. alba*, two. The *Micromus* and the *Hemerobii* were taken by Mr. W. J. Ashdown while beating. One *Tetrix bipunctatus* (Orthoptera) was taken in imaginal condition by Mr. A. Sich. It being damp a few *Helix pomatia* were found in a state of 'activity.'

"Though the weather was dull and insects were not numerous the early summer flowers were very plentiful. Honeysuckle was commencing to bloom and some clumps were profusely covered with flowers. Seven orchids were met with in blossom—*Ophrys muscifera* (fly orchid), *Habenaria bifolia* (butterfly orchid), *Listera ovata*, *Cephalanthera pallens* (white Helleborine), *Neottia nidus-avis* (bird's nest orchid), *Orchis maculata* (spotted orchid), and *Habenaria conopsea* (sweet-scented orchid). The last was particularly fine and abundant, and one or two practically white blooms were obtained. *Ophrys apifera* (bee orchid) was not seen. Other plants noted were:—*Geranium columbinum*, on the chalk; *Chaerophyllum temulum* and *Lithospermum officinale*, both by a pathside in a wood near Newland's Corner: *Anthyllis vulneraria*, *Hippocrepis comosa* and *Lotus corniculatus*, both plentifully; *Carduus nutans*, of very fine colour; *Linum catharticum*; *Asperula cynanchica*, a local plant; *Rosa canina* and *R. arvensis*, the latter not well out; *Orobanche minor*, a parasitic plant; *Valeriana officinalis* (the cat valerian); three Campions—*Silene cucubalus*, *Lychnis diurna*, and *L. respertina*; *Spiraea filipendula*; *Helianthemum vulgare* (rock rose), one or two having white petals with a yellow base. On or near the Sheep-leas was secured a plant new to the party, which was found to be *Thesium humifusum*, some specimens being much attacked by a rust fungus (*Puccinia thesii*). Strawberries were large, numerous, and well flavoured.

JULY, 13th, 1916.

Mr. H. A. Leeds exhibited a box containing a large number of aberrations of *Polyommatus icarus*, taken in May and June this year in Huntingdonshire, viz.:

1. Male underside, with heavy black markings inside of hind

margins, consisting on forewings of—1 streak, 4 wedges, and 2 streaks, and on hindwings 6 long streaks and 2 wedges, latter coalescing. Ocelli absent except at base.

2. Male approaching *ab. obsoleta*.

3. Male underside, forewings with 5 ocelli, hindwings approaching *ab. obsoleta*.

4. Male underside, very small ocellated markings.

5. Male underside, forewings slight whitish striation and few additional small ocelli.

6. Male underside, ocellated markings much nearer central spot on all wings, several absent, hindwings show slight coalescence.

7. Male upperside, asymmetrical, and right forewing partially bleached.

8. Gynandromorph. Left forewing with interrupted blue streak crossing wing. Right forewing with slight trace of blue.

9. Gynandromorph. Left forewing slight blue mark at tip.

10. Female upperside, large marginal markings.

11. Female upperside, forewings black margin, no markings, hindwings small, markings almost without orange.

12 and 13. Females upperside, deep orange lunules.

14. Female upperside, large, palish brown, slight blue suffusion, large orange lunules (similar to pale forms of *Agriades thetis* (*bellargus*)).

15. Female, bluish right forewing with bleached blotch.

16, 17, 18, 19, 20 and 21. Female uppersides, blue with whitish wedge-shaped markings (*ab. angulata*?).

22. Female upperside, very dark velvety blue ground, forewings with whitish wedge-shaped markings, orange markings very slight on all wings (*ab. angulata*?).

23 and 24. Females, uppersides, blackish ground with whitish wedge-shaped markings on forewings (*ab. angulata*?).

25. Female *ab. cerulea*, with whitish costal margin.

26. Female approaching *ab. obsoleta*.

27. Female underside, forewings innerside of hind margins, also all spots, very black.

28. Female underside, forewings smoky-whitish suffused.

29. Female underside, forewings black spots, large.

30. Female underside, several black spots elongated or enlarged, and few small additional ocelli.

31. Female upperside, pale blue, considerable portion of forewing suffused whitish-lilac.

32. Female upperside, very dark ground and slightly bordered.
33. Female, blue markings, almost confined to a few black dots.
34. Female, blue, margin of hindwings suffused with broad whitish-blue.
35. Female, hindwings with additional edging of blue on inner-side.
36. Female, blue with large bright marginal markings.
37. Female, blue with small marginal markings.
38. Female, blue, forewings with dark border, hindwings large black marginal spots.

Mr. H. Main exhibited—

1. Pupa of *Geotrupes spiniger* obtained in confinement from ova.
2. A pair of living *Copris lunaris* from Surrey, where it had occurred in some numbers in several places, together with a mass of cow-dung enclosing an ovum, and a photograph of the vault excavated by the beetle to contain these egg masses, of which as many as seven may be found in a single excavation.
3. A larva of the scorpion-fly, *Panorpa germanica*, feeding on a white Dipterous larva.
4. An ichneumon just bred from a disc of the larva of the saw-fly of the alder, *Phyllotoma vagans*. The disc of this larva forms the pupa-case, but is not detached as with *P. aceris*.

5. The larva of the saw-fly of the Solomon's Seal, *Phymatocera aterrima*. The female of this species lays parthenogenetic eggs.

The Rev. F. D. Morice exhibited a British specimen of the wasp *Polistes gallica*, taken by Mr. J. H. Harrison, at Wolsingham, Durham, some distance from the sea-coast. The species was common all over the continent but extremely rare in Britain, and when found generally near some port visited by ships from the continent.

Mr. Priske exhibited shells of the Mollusc, *Physa hymnorum*, from Braunton Burrows.

Dr. Chapman exhibited the larva of *Tricopteryx riretata* from Reigate, feeding on the flowers of *Cornus sanguinea*.

Mr. Hy. J. Turner exhibited—

1. The cocoons of the Micro-lepidopteron *Bucculatrix aurimaculella*, which much resembled miniature cocoons of a Zygaenid. They were pure white, and the pupa cases were protruding from one end in some instances where imagines had been produced, in others a comparatively large round hole in the side of the cocoon showed where a parasite had emerged.

2. Leaves of birch which had been mined by the larva of a beetle.

Orchestes rusci. Each leaf showed a perfectly circular hole at the end of the mine from which a portion of the leaf had been cut to form a flat circular case, the pupa being secured between the two surfaces of the leaf. The case when completed was separated and fell to the ground.

3. The beautiful open network cocoon of the Micro-lepidopteron, *Chrysocorys festaliella*, an anomalous species which systematists had placed in various positions in the lists. It was attached to a rose leaf.

4. The curious tubular larval cases of a Tineid formed on dog's excrement. It had been sent from Aden to the late Dr. Buchanan White.

Mr. Bunnett exhibited (1) the flowers of a species of *Aristolochia*. (2) A spike of the Marsh Orchid, *Malaxis paludosa*, which was preserved in a solution of $2\frac{1}{2}\%$ of formalin. The structure was admirably preserved, although it had been in the solution for the past six years. (3) Larval cases and living imagines of *Coleophora nigricella* on hawthorn, and added a few details of larval habits, which he hoped later on to more fully describe.

Mr. F. B. Carr exhibited a pupa of *Gonepteryx rhamni*. Several members noted that the larvæ of this species had been particularly common this year.

Mr. R. Adkin communicated the following "Notes on the Season":—

"The season at Eastbourne has, so far, been disappointing. Occasionally a few fine warm days gave promise of things to come, but hardly had one realised their possibilities when it would turn wet or cold again, or both. The very wet month of March, as a matter of fact the wettest March on record, and the bitterly cold weather of its closing days, seem to have left their mark on the season, added to which my opportunities for observation have been few, yet it may not be without interest, on an occasion when we are invited to give our experiences of the season, to mention briefly what has come under my notice in this locality.

"Although the latter days of March had been so inclement, the 1st of April was a very fine day and fairly warm, and I met with my first butterflies of the season, some half dozen or more *Aglais urticae* being on the wing in a sheltered corner of the Downs. The 2nd was even finer, and in my garden I saw several more *A. urticae* and a couple of *Celastrina argiolus*, while a very lively *Sesia* (*Macroglossa stellatarum*) was seen on the sea front buzzing along the stones of the parade walls. Then we had more cold weather, but on the

23rd it was sufficiently warm and sunny to bring the *Porthesia chrysorrhæa* larvæ, which were very abundant on some blackthorn bushes on the Downs, out of their nests in search of food.

"Having a few fine warm days at the end of the month white butterflies began to get common, and on the 30th *Pieris rapæ* and *P. napi*, also *C. argiolus*, were all flying in the garden in some numbers, the last named being quite abundant, and this species continued on the wing until May 21st, while the 'Whites' were flying on fine days right up to July 2nd, when the last was seen, the later brood does not appear to have yet started with us. *Tortrix prunibana* was flying in the garden on May 28th, and I have no doubt also on other sunny mornings about that date, when I was not there to see it. On the same day *Polyommatus icarus* favoured us also.

"During June we found that *Xanthorhœ* (*Melanippe*) *fluctuata* was just as frequent in our garden here as in the London gardens, but, so far as we were able to observe, less prone to variation. Odd specimens of *Dicranura rinula*, *Acronicta aceris*, *Mamestra brassica*, *Eupithecia vulgata*, *Hepialus lupulinus*, and such like species were met with. It was also reported to me that early in the month a single specimen of *Colias edusa* had been seen on the Downs near Shoreham, Sussex. On July 2nd I watched a specimen of *Aglais urtica* feeding at the Valerian blossom on the parade for several minutes, its colour was dull, suggesting that it was not freshly emerged, but in other respects it appeared to be perfect. And on the 9th a *Sesia* (*Macroglossa*) *stellatarum* spent some time around a large plant of *Anchusa* in the garden, apparently well satisfied with such nectar as he was able to extract from its blossoms. These two insects can hardly have been the progeny of the April specimens, but if not whence came they?

"It's raining and blowing hard and horribly cold as I write, so I can't say much for the season."

Mr. Curwen had spent some days in the New Forest recently, and subsequently also in Ashdown Forest. He found that imagines were generally scarce, while larvæ were plentiful. From June 15th to 24th he was taking *Brenthis selene* in the New Forest in good condition. On June 27th, at Tilgate, the species was worn to rags, while on June 29th, at Ashdown, it was quite fresh. *Cleora jubata* (*glaberraria*) and *Aleucis pictaria* were in some numbers in the larval stage in the New Forest.

Mr. Hare had found things generally up to date in various localities.

Mr. Newman remarked that *Agriades thetis* was in thousands in North Kent, and was a grand sight, the whole hill-sides were coloured with them. Some twenty-five years ago it was equally abundant in the same area, but in the intervening period had been very uncertain in its appearance and had practically disappeared.

The Rev. F. D. Morice had spent a fortnight at Swanage and a fortnight at Brockenhurst, returning on July 6th. During the whole time the weather was quite unsuitable for Hymenoptera, cold and windy at Swanage, incessant rain on several days and very little sunshine on others in the New Forest. He had taken one good species at Studland, *viz.*, a male of the very rare *Miscophus maritimus*, hitherto recorded only from Deal. *Limenitis sibilla* was pretty abundant on one day in the New Forest. A wounded officer whom Mr. Morice had met had taken seven fine examples. Several members reported that the larvæ of this species had been very scarce for some time past.

The Rev. F. M. B. Carr communicated the following "Notes on Collecting in Staffordshire in early July 1916."

"I have had a much better week this week, but the weather has been pretty awful on the whole. However 'It's an ill wind, etc.,' for although many of the days have been bad, it has helped things at night as the moon has been hidden. Now the weather seems to be improving a bit so of course we are getting the moon at night. We 'bug-hunters' are hard to please.

"I went out sugaring when I arrived on Monday. The weather had been very wet during the day, and there were heavy clouds and thunder about at night. I had studied the Staffordshire List before coming, and saw that somebody had taken many *Aplecta tincta* at sugar in Burnt Wood, so I was hoping to get a few, as it appeared from the books to be about the right time for it. The great question was, 'Would sugar be any good?' Well to make a long story short things swarmed at sugar and sure enough there was *A. tincta*. I took over 30 that night, and could probably have taken another 30 if I had wished—gloriously fresh ones too. It is a lovely thing when fresh. Other species at sugar were *Triana psi*, *Phaenocarpa ruficincta* (including 1 ab. *salicis*), 2 or 3 *Cymatophora duplaris*, *Xylophasia monoglypha* (*polyodon*), *N. rurea*, *Leucania comma*, *Miana strigilis*, *Rusina tenebrosa*, *Agrotis exclamatoris*, *A. segetum*, *A. strigula* (*porphyrea*), 4 *Aplecta prasina* (*herbida*), *A. nebulosa*, *Noctua plecta*, *N. augur*, *N. festiva*, *Apamea gemina*, *Mamestra thalassina*, *M. oleracea*, *M. trifolii* (*chenopodii*), 2 *M. pisi*,

Triphena pronuba, *Euplexia lucipara*, and *Amabe viridaria* (*pectinitaria*).

"This was an encouraging start; on some patches there were between 20 and 30 moths.

"Tuesday evening was much the same, and I got another *P. rumicis* ab. *salicis* and a few more *A. prasina*. The additional species were *Leucania pallens*, *Miana fasciuncula*, *Thyatira batis*, *Habrosyne detersa*, *Apamea basilinea*, *Noctua c-nigrum*, *N. brunnea*, *Dipterygia scabriuscula* (*pinastris*), and *Metrocampe margaritaria*.

"Wednesday was a comparative failure owing to cold and moon. Thursday was impossible owing to downpour most of the day and all the night.

"Friday turned out the best night so far, after a very wet day. A friend came over and he was delighted to get *Aplecta tinctoria*, as he had never seen it common before. He took as many as I did on Monday, or more. A fresh species was *Acrionicta leporina* of which I took three and my friend two. Two were of the usual form and three appear to be ab. *melanocephala* which is said to be taken in the Liverpool district. They are much darker and have a black thorax. I also took about eight *A. prasina* and one or two *C. duplaris*. *Leucania lithargyria*, *Cuspidia megacephala*, *Bomolocha fontis* (3), *Semiothisa notata* (1), and *Cidaria corylata* were the new comers—40 moths on one patch!

"Last night we had the moon again and things were not nearly so good, I took only one dark *X. monoglypha*. The new-comers were *Phlogophora meticulosa* and *Mamestra brassicae*. The greatest number on one patch was 20.

"Day work was fair:—*Brenthis selene* (abundant), *Diacrisia sannio* (*russula*), *Eulype hastata*, *S. notata*, *B. fontis*, *Encosmia undulata*, *Lygris populata*, *Chloroclystis debiliata*, *Boarmia repandata*, *Venusia cambrica*, *Pylarge fumata* (1), *Leptomeris strigilaria*, etc.

"Burnt Woods are very extensive and consist chiefly of oak and birch, carpeted with bilberry and heather. There is also a considerable open heath space and a big alder swamp."

July 22nd, 1916.

FIELD MEETING AT BOX HILL.

Leader.—HY. J. TURNER, F.E.S.

The meeting was quite a successful one as regards numbers,

although but little collecting seemed to be done. Insects were generally scarce and reports of captures more so. There were some twenty-six members and friends present of whom eight formed a morning party. The slopes, woods and valleys at the back of Box Hill proper, were wandered over and some useful things obtained.

The following Lepidoptera were reported by various members.—

RHOPALOCERA.—Generally very scarce on that portion of the hill visited. *Epinephele jurtina*, *Ctenonympha pamphilus*, and *Pieris rapæ*.

BOMBYCES, ETC.—A colony of *Zygana filipendulæ* (cocoons) at the foot of the slope to the main Dorking road produced nothing but minor aberration; *Lithosia deplana*.

GEOMETERS.—*Ourapteryx sambucaria*, *Hydriomena furcata* (sordidata), *Metrocampa margaritaria*, *Cabera pusaria*, *Boarmia gemmaria*, *B. abietaria*, *Ortholitha bipunctaria*, *Camptogramma bilineata*, *Pylarge* (*Acidalia*) *aversata*, *Ptychopoda* (*Acidalia*) *trigeminata*, *Melanthia procellata*, *Mesoleuca bicolorata*.

DELTOIDS.—*Hyppena proboscidalis*, *Zanclognatha tarsipennalis*.

PYRALES.—*Agrotera nemoralis*, *Botys ruralis*, *Cledeobia angustalis*, *Ebulea crocealis*.

CRAMBI.—*Crambus chrysonuchellus*, *C. geniculens*, *C. pascuellus*.

ALUCITIDÆ.—*Stenoptilia pterodactyla*.

TORTRICES.—*Tortrix forsterana*, *T. xylosteana*, *Phoropteryx comp-tana*, *Argyrotoxa comeyana*, *Batodes angustiorana*, *Chrosis alcella*, *Cydia* (*Carpocapsa*) *splendidana*, *Aphelia osseana* (pratana.)

Mr. Lucas reported that ORTHOPTERA were numerous and the following species were noticed:—*Chorthippus parallelus*; *Stauroderus bicolor*; *Omocestus viridulus*; *Gomphocerus maculatus*; and *Tetrix bipunctatus*. The only Neuropteran was *Hemerobius stigma* taken by Mr. W. F. Ashdown, which he thinks he swept from Yew. On Mr. Lucas' return Glow-worms were shining at Oxshott Station.

Mr. Lucas has sent the following interesting remarks on the flowers and plants observed during the day.—

“Wild flowers were numerous and, amongst others, the following were noticed:—*Orchis pyramidalis*; *Epipactis latifolia*, Broad-leaved Helleborine (nearly out); *Papaver somniferum*, Opium poppy (given to me by a visitor); *Hypericum hirsutum*, Hairy St. John's Wort; *Malva moschata*, Musk Mallow; *Geranium pratense*, Meadow Cranes-bill; *Asperula cynanchica*, Squinancy-wort; *Luula conyza*, Ploughman's Spikenard (nearly out); *Mono-tropa hypopithys*, Bird's-nest (under Beech); *Campanula glomerata*,

Clustered Bell-flower; *Spiræa filipendula*, Drop-wort; *Erythræa centaurium*, Centaury; *Echium vulgare*, Viper's Bugloss; *Pastinaca sativa*, Parsnip (downy form); *Verbascum blattaria* [I make it this and not *V. nigrum*]; *Galeopsis ladanum*, and *Impatiens parviflorum* [I make it this species] found by Mr. Turner."

JULY 27th, 1916.

Mr. Stanley Edwards exhibited the fungus *Polyporus sulphureus* found on the occasion of the Field Meeting held at Box Hill on July 22nd. It was said to be edible and to taste slightly astringent. Its odour was fragrant, becoming disagreeable. Its habitat was living trees and stumps of oak, yew, chestnut, willow, cherry, alder, poplar, walnut, pear, apple, larch, robinia, ash and pine, from May to October. The pileus was covered with crystals of binoxalate of potash. In times past it was much used for tinder. Tree-trunks that are attacked usually rot in the centre leaving the outside sound. It is sometimes phosphorescent. *Ceratomyces aurantiacus* has been stated to be an imperfect state of this species.

Mr. Frohawk exhibited a figure of a unique and extraordinary form of *Melanargia galathea* in which there was neither trace nor suggestion of the black markings usual on either surface, but there was a slight general suffusion of yellow. The specimen was taken in July, 1843, in the neighbourhood of Walmer, Kent.

He also showed a specimen of *Euchloë cardamines* in which all trace of black coloration even on the underside of the hindwings was absent, and an example of *Colias hyale* in which the intensity of all the dark and black markings was weakened to a faint dusky shade.

For some weeks he had been in Norfolk and during almost the whole time there had been an extreme scarcity of insects and most of the few he had met with were late in their appearance.

Mr. Hy. J. Turner exhibited a short series of *Parnassius apollo* var. *valaisica* from Macugnaga, South side of the Alps, and ab. *montana* from St. Moritz, the high mountain form. The former were large in size and more brilliant in coloration, the latter were small and generally less emphasised in colour and marking.

Mr. Turner also exhibited larval cases of a number of species of *Coleophora*, which he had bought with many similar specimens of numerous genera, mostly Tineid, in a small tobacconist's shop at

Nunhead. He was now practically certain that they had formed part of the collection of the late H. T. Stainton, but as to how they had reached the hands of a "picker-up of unconsidered trifles" he was unable to say. The whole of the specimens, as well as the glass-topped boxes in which they were contained, were clean and well preserved, and most of them were labelled and dated, often with the name of the correspondent, such as Millière, Ragonot, Walsh, Elisha, Healy, Buchanan White, Frey, Mühligh, etc. There was little doubt that some of the specimens were those which were referred to in Stainton's "Tineina of Southern Europe," published in 1869. Among the contents of the boxes were—

Coleophora calycotomella. Larval cases on *Calycotome spinosa* from Cannes, March, 1867. These are probably the cases discovered by Stainton when collecting at Cannes with M. Millière, the famous entomologist of South France. They are referred to by Stainton on page 225 of "Tin. Southern Eur."

Coleophora chamædryella. On page 213 of the above work this species is referred to as occurring in the larval stage at Mentone, in March 1866. The box exhibited is so labelled, and probably contains the cases therein spoken of. The larvæ feed upon *Teucrium chamædryis*.

Coleophora giraudi. The species whose larva makes this curious case is apparently rare. It was described in the French "Annales" by Ragonot, to whom it had been sent by Giraud, its discoverer. M. Millière, "Cat. Rais.," subsequently gave the food plant of the larva as *Dorycnium*.

These three species are from the South of France.

Coleophora musculella. The larva feeds on *Dianthus superbus*. The date on the label is May, 1861, and the letters "F and M" I take to be the initials of Stainton's correspondents Frey and Mühligh. The species was not described until 1864. Stainton refers to these in "Ann," 1862, p. 134, as having been received in May, 1861, from Mühligh.

Coleophora polonicella. Zeller described this species in 1865, in the "Ent. Zeit. Stett.," and the date of the specimens exhibited is June 10th, 1866, Zeller. The larva feeds on *Astragalus arenarius*. It is, I believe, a very rare species.

Coleophora cornuta. The larva which makes this beautiful cornucopia-like case was sent to Stainton by Frey. I have so far been unable to find further information about the species as Stainton only lists it as a new species.

Coleophora otitæ. This species was described in 1839 by Zeller, in the "Isis." The larva feeds on *Silene otites* and *Silene nutans*, on the underside of the leaves.

The above four species are from the Central European area.

Mr. Bowman exhibited a specimen of the Coleopteron *Lytta* (*Cantharis*) *vesicatoria* (the Spanish Fly), taken in the Isle of Wight, which is apparently a new locality for it. It is said to be rare in this country; records of its occurrence in Hampshire, Gloucestershire, Cambridge, and Essex have been published.

Mr. B. S. Williams exhibited several species of the genus *Eupithecia*, including *E. lariciata* from Leith Hill, with two melanic forms, *E. castigata* from Yeovil, a melanic form from Finchley, and a series bred from larvæ taken on the occasion of the Society's Field Meeting at Oxshott last autumn, and also *E. albipunctata*.

Mr. Sperring exhibited (1) dwarf specimens of *Polyommatus icarus*, measuring respectively—a male from Cuxton, 2nd brood, 1911, 22mm., a male 24mm., and a female 22mm., both from Portsmouth 1st brood, June, 1916; (2) very light forms of the same species from Cuxton and Portsmouth; (3) a series of blue females of the same species from Portsmouth; (4) a specimen of *Eupithecia oblongata* (*centaureata*) with a strongly marked transverse bar on the forewings, which was expanded to a large blotch on the costa; (5) seven specimens of *Epinephele tithonus* from Sidmouth, in all of which there were two additional eyespots on the forewings; and (6) a female of the spring brood of *Pieris napi*, of yellow coloration, the forewings being much stronger in shade of yellow.

Mr. F. W. Frohawk called attention to the very destructive habits of the larvæ of the Stag-beetle, *Lucanus cervus*, in attacking the base of posts around the gardens in his neighbourhood. There was scarcely one which had not suffered from these depredations. Several members confirmed the remarks of Mr. Frohawk as to the destructiveness of these beetles.

AUGUST 10th, 1916.

Mr. H. M. Stewart, M.A., M.D., of Dulwich, was elected a member.

Mr. Leeds exhibited a short series of *Hibernia leucophæaria* from Herts, March, 1916, showing light and banded forms with the dark margined ab. *marmorinaria*, and with the black ab. *merularia*; and an aberration of *Polyommatus icarus*, viz., a ♀ upperside, ground

colour blue, paler approaching outer marginal areas, and terminating in whitish wedge-shaped markings; forewings without orange spots, but hindwings largely bordered; taken in Herts, in June, 1916.

Dr. Chapman exhibited a series of *Vespa noregica*, and said, "This wasp has, so far as I can learn, been not uncommon near Reigate this summer, these specimens are from a large nest taken ten days ago. The species is common in the north, but apparently very rare in S.E. England. During many years collecting at Reigate Mr. Frisby does not appear to have met with it here, but has once taken it in Kent. The female specimen has the 3rd and 4th abdominal segment dorsally fused."

Dr. Chapman also exhibited bred specimens of *Selenia bilunaria*, and contributed the following note:—

"I had some *Selenia bilunaria* which emerged rather early, and not wanting them as specimens they laid a number of eggs, and these I reared, rather because other work amongst living insects was scarce, at any rate they fed up and pupated at a fairly normal rate, and tolerably together. But in their emergence as imagines they have been coming out often several a day, now and then more, for the past two months, and there are still a number in pupa, whose intention I don't know. The moths that have emerged are some of the spring and some of the summer form, the difference having no relation to earlier or later emergences.

"I only recently pinned a few specimens, so that perhaps the exhibit wants the most characteristic specimens. This mixing of both forms in the summer brood is, I fancy, very usual, but I did not know it was associated with such a prolonged emergence."

Mr. Hugh Main exhibited living plants of the rare Bladder-wort, *Utricularia neglecta* from Epping Forest; the pupa of the tiger-beetle, *Cincindela campestris*, produced in one of his small observation cases; and a brilliant red fungus, *Peziza* sp., from Epping Forest.

Mr. Hy. J. Turner made the following exhibits:—

1. The life history of *Coleophora nigricella*, including numerous bred specimens, larval cases, both the small curved cases used for hibernation and the straight more mature cases and leaves of the hawthorn to show the mines of the larva and the angle of attachment of the case.

2. The "winter cots" or hybernacula of a species of N. American *Limenitis*. The young larva eats away the willow leaf

on both sides of the midrib for some distance from the apex and folds the two sides of the remaining portion of the leaf neatly together, closing the tube at the bottom but leaving it open towards the apex. In addition to this it secures the petiole of the leaf to a twig by a band of silk, to prevent its falling to the ground.

3. A number of cocoons of *Nepticula euphorbiella* made by larvæ collected by the late H. T. Stainton at Mentone, in March, 1867, in mined leaves of *Euphorbia dendroides*.

4. The three leaves of the cork tree, *Quercus suber*, from which Stainton bred a new species of *Nepticula*, *N. suberis*, in 1868. The larvæ were met with at Mentone in March 1867. The mines are large blotches on the upperside of the leaf.

5. A number of cocoons of *Nepticula catharticella* made by larvæ taken in March, 1867, at Mentone, feeding in mines in the leaves of *Rhamnus alaternus*.

6. Three leaves of *Quercus suber* showing the tortuous mines of the larvæ of *Nepticula suberivora* with the cocoons. The species was discovered by Stainton at Cannes, on March 9th, 1867.

7. Cocoons and webs of *Zelleria phillyrella* among twigs and flowers of *Phillyrea angustifolia*, taken by Stainton and Millièrè in March, 1867, at Cannes.

These specimens of Microlepidoptera are all referred to, or described, in Stainton's "Tineina of Southern Europe," pp. 224-229, as forming part of his "cabinet of economics."

AUGUST 12th, 1916.

FIELD MEETING AT ROYSTON, HERTS.

Leader.—A. E. Gibbs, F.L.S., F.Z.S.

This was a whole day meeting somewhat beyond the area within which the Society usually holds its meetings. The special object was of course to obtain specimens of the races of *Agriades coridon* for which this locality has recently become so well known.

About a dozen members and their friends were present and all returned quite satisfied with the day's work. *A. coridon* was in countless numbers and aberrations were obtainable, but needed much patient selection. The forms *ab. semisyngropha*, *ab. roystonensis*, *ab. inaequalis*, etc., of varied degree of emphasis were taken. It was particularly noted what a large number of pairs *in cop.* were

observed, especially in the late forenoon. Very bright fresh examples of *Urbicola comma* were in number, and *Pararge megera* with *Epinephele jurtina* were observed.

The party sat down to tea in a pleasant garden at the back of one of the houses in the town, and an early return to London was made.

AUGUST 24th, 1916.

Mr. Stanley Edwards exhibited a Flying-fox, *Pteropus* sp., from Australia, and communicated the following note on the genus:—

“ The genus *Pteropus* has more than 40 species. All are of large size, and the absence of a tail, the long pointed muzzle, and the woolly fur covering the neck, render their recognition easy. They are commonly known as ‘Flying Foxes,’ or ‘Fox-Bats.’ One species from Java measures five feet across the fully-extended wings, and is thus the largest known species of the order. The range of this genus extends from Madagascar and the neighbouring islands through the Seychelles to India, Ceylon, Burma, the Malay Archipelago, S. Japan, New Guinea, Australia and Polynesia (except the Sandwich Islands, Ellice’s Group, Gilbert’s Group, Tokelau, and the Low Archipelago). Of the islands inhabited by it some are very small and remote from any continent, such as Savage Island in the South Pacific, and Rodriguez in the Indian Ocean. Although two species inhabit the Comoro Islands, which are scarcely 200 miles from the African coast, not a single species is found in Africa, but in India, separated by thousands of miles of almost unbroken ocean, a species exceedingly closely allied to the common Madagascar Fox-Bat is abundant. The Malay Archipelago and Australia are their headquarters, and in some places they occur in countless multitudes. Mr. Macgillivray remarks of *P. conspicillatus*, “On the wooded side of a hill on Fitzroy Island, I one day fell in with this bat in prodigious numbers, looking while flying in the bright sunshine (so unusual for a nocturnal animal) like a large flock of rooks. On close approach a strong musky odour became apparent, and a loud incessant chattering was heard. Many of the branches were bending under their load of bats, some in a state of inactivity, suspended by their hind claws, others scrambling along among the boughs, and taking to wing when disturbed.”

Mr. Hugh Main exhibited :—

1. Larva, pupa and imago of the water beetle *Pelobius tardus*, dug out of the bank at the margin of a pond in Epping Forest.

2. A Syrphid Fly killed by a fungoid growth, the eyes, centre of the thorax on dorsum and the wings being curiously bare of the growth.

3. Ova of *Hemerobius concinnus*.

Mr. Curwen exhibited bred series of *Cleora lichenaria* and *Cleora jubata* (*glabraria*) from the New Forest. The larvæ of the former were fed on a lichen of the genus *Ramalina* and the latter on a species of *Cladonia* and neither would eat the other's food. Lettuce was left untouched even when there was a shortage of food. The larvæ of *C. jubata* were unusually plentiful at Denney Wood, New Forest. Dr. Robertson and he took 40 in a late afternoon's collecting. He also showed a *Xanthorhœ fluctuata*, entirely asymmetrical in shape and markings. It was suggested that it might exhibit gynandromorphic genitalic characters if examined.

Mr. Hy. J. Turner exhibited further details in the life-history of the following species of Micro-lepidoptera.

1. A leaf of *Viburnum tinus*, *lauristinus*, picked in the Boboli Gardens at Florence, on January 3rd, 1869, which produced *Lithocolletis lantanella* on April 3rd ("Tin. South. Eur.," p. 296), and a series of British *L. lantanella*. It is a local species.

2. A leaf of oak which was curled into a pyramidal shape by the larva of *Gracilaria alchimiella* (*swederella*), and imagines of the species. Common.

3. Galleries of the larva of *Gelechia pinguinella* (*turpella*) from Ratisbon, presumably sent to Stainton by Zeller in November, 1863, and British imagines from Cheshunt. It is a local species.

4. Leaves of *Crataegus pyracantha* with mines on the uppersides of the larvæ of *Lithocolletis leucographella*, a non-British species. They were found by Stainton at Florence on March 2nd, 1863, but he was unsuccessful in breeding the imagines. ("Tin. South. Eur.," p. 207.)

5. The beautiful net work cocoons of *Epiblemia* (*Chauliodes*) *strictellus*, sent to Stainton by M. Constant in November, 1886.

6. A number of larval cases of a *Coleophora* sp. found feeding on the seeds of *Chenopodium maritimum* by our former member G. Elisha, and sent by him in November, 1881, to Stainton as *C. salinella*. There is a doubt as to the species which is more probably *Coleophora laripennella*, of which I exhibit the life history.

The larva of *C. salinella* is supposed to be confined to the seeds of *Atriplex portulacoides*.

Mr. Turner also exhibited coloured figures of a dozen striking aberrations of *Dryas paphia*.

Mr. Frohawk exhibited some most remarkable forms of *Arctia caja* bred from larvæ taken by him in the Scilly Islands, including a practically unique specimen with forewings uniformly chocolate not even showing a subdued outline of the fainter markings as many aberrations do. The hindwings of this specimen had nearly the whole wing suffused with black, but in this case the indications of the usual round spots were marked by a violet tint seen when the specimen was held in certain positions. The other specimens showed these tendencies more or less, particularly in the union of the dark spots and blotches on the hindwings. One specimen had conspicuously yellow ground colour on the hindwings.

Mr. Wolley Dod exhibited a specimen of *Saturnia pavonia* in which the antennæ were intermediate in development between those of the male and those of the female. The pectinations were considerably developed although the insect was apparently, from wing markings and body, a female.

Mr. Lachlan Gibb exhibited flower-heads of the common teasle (*Dipsacus sylvestris*) and of the fuller's teasle (*D. fullonum*) and remarked on the development of the scales of the receptacle into strong hooks at their extremities. It was remarked that some authorities considered the latter as a derivative from the former and not a true species.

Mr. Bunnett exhibited an example of the rare plant *Trifolium resupinatum* from Hayes Common, together with several ripe capsules. He also showed a specimen of the glow-worm (*Lampyris noctiluca*) with bifurcate tibia of the hind leg.

Mr. Carr exhibited a living specimen of *Platyptilia gonodactyla* taken by him in the heart of the city.

Mr. Frohawk remarked on the occurrence of *Amorpha populi* and suggested a second brood. Mr. Turner had also had a fresh specimen brought indoors by a cat a few days before.

Mr. H. Moore exhibited a short series of *Agriades coridon* from Royston, including ab. *semisyngnapha* and ab. *roystonensis*, and read the following note.—

AGRIADES CORIDON.—GYNANDROMORPHS AND AB. ROYSTONENSIS.

“GYNANDROMORPHS:—To describe these blue-scaled females as

gynandromorphs is to my mind absolutely wrong. They are in all particulars save adornment true females, presumably fertile and functionally perfect and positively as capable of pairing as their normal sisters, that is if any Royston ♀ can be said to be normal.

"The possession of a secondary ♂ character does not alter sex, though it might indicate decreased fertility in the higher orders, but here we have nothing to do with age. On August 12th last, I took a number of paired couples, and found several blue-scaled females amongst them. In looking over my series I can see no approach to the male in the shape of the wings, however blue they may be, but on the contrary, as if to accentuate their sex, the red lunules on the margins of the hindwings are as a rule conspicuously developed and in a variety of unusual ways. In speaking of gynandromorphs we are dealing with FORMS not TRIMMINGS, and these blue females are no more such, than those hirsute ladies whose faces have not a truly feminine appearance though their features may be perfect.

"It ought not to be difficult to find or coin a word of truer descriptive application to these masculine females of *coridon* or any besides.

"AB. ROYSTONENSIS:—The enthusiasm of Mr. Pickett over the Royston forms of *A. coridon*, is probably shared by all who have collected there, but he is really very unfortunate in wishing to confer the name of *roystonensis* on what is nothing more than a set of cripples. These misshapen specimens, like others to be found all over the world, appear to me to be the victims of a disease that is endemic at Royston, and not even there confined to *coridon*.

"What is wanted is a pathological term that will cover all similar cases wherever found.

"Take goitre for instance. 'Derbyshire neck' might do for it in that county; it would be absolutely senseless in the Alps or Himalayas, yet the disease is known to the doctors of all climates, by one word, understood by all, whatever their mother tongue. How can we say *Papilio clearchus* ab. *roystonensis* or *P. thestylis* ab. *roystonensis*, of the S. American and Indian faunas!

"If it is advisable to call any form of *coridon* ab. *roystonensis*, let it be bestowed on one well defined and developed, rarely found elsewhere.

"Mr. Pickett tells us that last year he examined 60,000 specimens and found 66 *roystonensis*, or say 1 per 1000. This is misleading, it is commoner than that. On my first visit (August

12th last) the day of the Field Meeting of the South London Ent. and Nat. Hist. Socy., I simply *collected*, that is I captured without *selecting*, and with the exception of several ab. *semi-syngrapha* hardly knew what I had got till setting them.

"In round numbers I took 100 females and 25 males, of these 8 were the so called *roystonensis*, 7 females and 1 male. Ten days later I only took 1 female in 40, the 5 males I took in addition were paired, but quite normal. I could make the percentage even higher for both occasions, but I have only reckoned as *roystonensis* those with wings appreciably smaller not those slightly so. If the shortening of the wings followed a rule, I could understand bestowing a distinctive name, but where it is now one side, then another, now forewings, then hindwings, then a mix up of the two, or only one or three of the wings. Why, I should have to invent another set of names before I could say which form of *roystonensis* I was referring to. The proposition is absurd."

SEPTEMBER 9th, 1916.

FIELD MEETING AT WESTERHAM, KENT.

Leader.—HY. J. TURNER, F.E.S.

This was a very pleasant autumn meeting, which brought together about a dozen members and friends. The early party wandered along the slopes of the Downs picking up a few blue females of *Polyommatus icarus* and noting *Cænonympha pamphilus*, some *Gonepteryx rhamni*, a specimen of *Pieris napi*, and a *Vanessa io*. On one slope large masses of the parasite *Cuscuta epithymum* were found in flower. The afternoon party went through the woods towards Limpsfield and were subsequently met by the morning party on Crockham Hill. Thence an eastern direction was taken for beating, but as there were few discoveries and time had flown, the path was taken through Squerries Park back to Westerham village to tea. Among the captures were *Lygris testata*, *Teras contaminana*, *Grapholitha ramella* and *G. penkleriana*, *Cerostoma costella*, and *C. radiatella* with other small species.

SEPTEMBER 14th, 1916.

The meeting was taken up with an exhibition and discussion of *Pararge aegeria*, introduced by the President.

Mr. Turner read a series of notes on the various points in connection with the species, of which the following is a summary:—

I. ORIGINAL DESCRIPTION.

1758. Linnæus.—“Systema Naturæ,” ed. x., p. 473.

Notes.—*a.* References to Reaumur, “Mem.,” vol. i., and Wilkes, “Papil.,” for figures (Northern form).

b. Habitat “in Europæ australioris,” and “in Mauritanis” (Southern form).

c. *Aegeria* not in Linnæus “Fauna Suecica,” 1762.

II. ENLARGED AND MODIFIED SUBSEQUENT DESCRIPTIONS.

(1) 1767. Linnæus.—“Sys. Nat.,” ed. xii., p. 771.

Notes.—*a.* “luteo-maculatis” substituted for “luteo-variegatis.”

b. “nec fasciatæ” added to the description. [Tutt remarks (*in lit.*) “This makes it almost certain that Cramer’s and Herbst’s *meone* do not represent the type.”]

(2) 1781. Fabricius.—“Species Insectorum,” vol. ii., p. 73.

Notes.—*a.* “Habitat in Europæ,” the African area omitted.

b. References for figures are in addition to Reaumur and Wilkes, Roesel, “Ins. belust.,” vol. iv., pl. 30; Sepp, “Besch. Ned. In.,” vol. i., pl. 6; Schaeffer, “Icones,” vol. i. (2), pl. 75; Esper, “Schm.,” vol. i., pl. 7; Bergstrasser, “Nomen.,” vol. ii., pl. 22; Harris, “Aurelian,” pl. 41; Petiver, “Gazoph.,” pl. 24. (All northern forms.)

III. NOMENCLATURE.

1758. *ageria* (not *eyeria*). Linnæus.—“Sys. Nat.,” ed. xii., p. 771.

1762. *tircis*. Geoffroy.—“Hist. Ins. Paris,” vol. ii., p. 48. (A duplicate name which has priority over *eyerides*.)

1775. *xiphia*. Fabricius.—“Sys. Ent.,” p. 492. (A Madeiran form, or a separate species.)

[Most authorities consider this a species. Tutt says (*in lit.*) “Most certainly a species.” Kirby at first did not but was subsequently disposed to do so. Staudinger calls it a species. Bethune-Baker, who went into the question very thoroughly in “Trans. Ent. Soc. Lond.,” 1891, has no

- doubt that it has specific rank. Seitz, in 1909, places it as a geographical race of *ageria*.]
1782. *meone*. Cramer.—“Pap. ex.,” vol. iv., p. 51, pl. 314 (described and figured from an Algerian form). [Tutt discusses this form (*in lit.*) and considers it a var. of *ageria*. Most writers do the same.”]
1789. *meone*. Esper.—“Abbild.,” p. 9, pl. 95, cont. 50 (described and figured an insect from Nîmes, which he considered to be Cramer’s *meone*). [Tutt says (*in lit.*) “Where to place this I don’t know. . . Kirby does not place this figure under *ageria*—Staudinger makes it equal the type, which it certainly does not.”]
1832. *xiphia*. Boisduval.—“Icones,” vol. i., p. 233, figs. 6 and 7. [Butler says, “Cat. Sat.,” p. 128, “This insect has nothing to do with the *xiphia* of Fabricius. M. Boisduval suggests the possibility of its being a variety of *meone*, which it neither resembles in structure, pattern nor coloration.”]
1847. *vulgaris*. Zeller.—“Isis,” p. 145 (from an example from Naples).
1871. *xiphioides*. Staudinger.—“Cat.,” ed. ii., p. 30 (diagnoses a Canary Is. insect as var. *xiphioides* of *xiphia*). [Bethune-Baker, *l.c.*, says that it is undoubtedly a local race of *ageria*.]
1871. *egerides*. Staudinger.—“Cat.,” ed. ii., p. 30 (as first reviser of the Fabrician scope of *ageria* restricts the original name to the S. European form, and names the northern form *egerides*, ignoring the prior *tircis*, Geof.)
1896. *pallida*. Tutt.—“Brit. Butt.,” p. 387 (described and named the extreme pale form from Irish specimens).
1896. *intermedia*. Tutt.—*l.c.* (described and named the form between the type *ageria* and the *egerides* form, typified by examples from Central France).
1908. *camana*. Fruhstorfer.—“Int. Ent. Zeit.,” Guben, p. 9 (local race from the Tyrol).
1908. *egestas*. Fruhstorfer.—*l.c.* (local race from Dalmatia).
1908. *fortunata*. Fruhstorfer.—*l.c.* (Canary Islands). [I can express no opinion on these three, except that the last must run *xiphioides* very closely.]
1908. *sidoa*. Verity.—“Bull. Soc. Ent. It.,” 1908, p. 114, fig. 7 (the slightly modified Sardinian race).

1916. *italica*. Verity.—“Ent. Rec.,” p. 167 (the slightly modified Italian race from the neighbourhood of Florence.)

? . *bipupillata*. Mosley.

1905. *cashmirensis*. Bingham.—“Fn. Ind.,” vol. i., p. 112 (sometimes thought to be a Himalayan form of *ageria*).

Note.—There is a considerable amount of unravelling of the various forms still needed. The *meone*, for instance, of the different authors are very different insects.

IV. TIME OF APPEARANCE.

1. Continental. Seitz says (“Mac. Lep.,” p. 133), “In the warmer districts the butterfly is on the wing all through the year, the numerous broods overlapping.”

2. British. Barrett says (“Lep. Brit. Isles,” vol. i., p. 231), “Doubtless the warmth or coldness of the weather, with the presence or absence of sunshine, is largely influential. The result of this susceptibility to external influences is that the butterfly is seen on the wing in different years in every month from March to October, or even November.”

V. GROWING SCARCITY (EVIDENCES OF).

1. Absence of species in lists of captures in all the magazines, particularly in the neighbourhood of London.

2. Practical disappearance from Hertfordshire: teste Mr. A. E. Gibbs in Annual Address to the Hertfordshire N. H. Society, 1916.

3. Records summarised by the Rev. C. R. N. Burrows for the last 60 years, “Ent. Record,” vol. xxviii., p. 112 (1916).

4. Disappearance from Ranmore Common, Bookham, Merrow, Epping Forest, Lewes, Kent, etc., teste J. Jenner Weir, Prof. Meldola, C. Fenn, Hy. J. Turner, etc.

VI. BREEDING EXPERIMENTS.

1898. Mr. H. Williams.—“Proc. S. Lond. Ent. S.,” p. 114. Ova laid July 27th, hatched August 7th, 1st larva pupated September 1st, 1st imago appeared September 19th, ♀. Rest pupated end of September. Some pupæ subjected to high dry temperature, some to high saturated temperature, some in a cage near the fire-grate, and eight out of doors from November. Imagines of first three sets emerged in November and December, the eight out doors emerged in early April.

1903. Mr. Carpenter.—*l.c.*, p. 59. Mr. Joy had a brood of larvæ from ova laid by a bred ♀ paired in captivity.
1904. Mr. Joy.—*l.c.*, p. 84. Insects bred from above pairing and two sets from a pairing of them exhibited. 80% hibernated as pupæ, emerging early in May. 20% hibernated as larvæ (half-fed) and emerged in June.

VII. VARIATION.

1. Characteristics. The best summary is Stephens ("Ill. Brit. Ent.," vol. i., p. 54). "This insect varies much in the intensity of its colours, particularly on its under surface; in some specimens the posterior wings are nearly plain griseous, in others they have a distinct broad, very irregular, central band." He refers to fine specimens having on the underside of the hindwings "the hinder margin purplish, with a series of white dots in lieu of the ocelli."

2. Lines of variation.

- a. Depth of ground colour, upperside.
- b. Intensity of the spots.
- c. Depth of ground and intensity of spots together.
- d. Number of eye-spots on lower wings (3-6).
- e. Development and extent of purple on lower wing underside.
- f. Shape of forewings (rounding of apex).
- g. Size and number of markings on the upperside (coalescence rare).
- h. Development of clouds to blotches (rare on hindwings).
- i. Duplication of apical spot (rare).
- k. Tendency of spots on hindwing to reduction to dots.
- l. Most constant spots on forewings are two in 1st transverse row, four in 2nd row, in size, shape and distinctness.

3. Sexual Variation.

Tutt ("Brit. Butt.," p. 388; 1896) says, "The males are considerably darker, having the pale spots much more restricted than the females, whilst towards the centre of the wing is an oblique shiny patch of androconial scales, easily detected if the butterfly be looked at sideways."

4. Aberrations. Striking aberrations seem rare.

- a. The apical ocellus duplicated. Said to occur regularly in the Channel Islands. The *bipupillata* of Mosley.
- b. Figure by Mosley "Ill. Var. Brit. Lep.," *Satyrus*, pl. 1, collection Sam Stevens. Dark area much decreased on all

- wings. No blotches, wide bands of light and dark across all wings. Apical eye bipupillate.
- c. Dale, "Hist. Brit. Butt.," p. 87, records one with light rings to ocelli on hindwings quite wanting.
 - d. Fowler, "Ent.," 1891, p. 285, records breeding a ♂ with all the pale spots replaced with tawny.
 - e. "Another almost unicolorous dark brown."
 - f. Fowler, "Ent.," 1893, p. 30, records a specimen "with extra central markings forming an interrupted broad band from tip of hind margin similar to *megea*."
 - g. A specimen "with the four spots surrounding the eye much reduced, all the others nearly obsolete."
 - h. One with "the row of eye-spots upon the hindwing reduced to white dots very slightly surrounded with black."
 - i. Many females "have an extra spot between the two near the anal angle and the one above" (forewing).
 - k. Others "have two inside the anal ones," (forewings), and
 - l. Some "have the ground all brown."
 - m. Barrett records, "Lep. Brit. Isl.," vol. i., p. 229, "a specimen almost of an orange colour taken in Hertfordshire in 1884," and
 - n. Another taken by Major Still on Dartmoor, in August, 1892. "Its forewings have most of the usual spots, more or less faintly indicated, but the hind- show no trace of the usual black spots, or of their yellow rings, or of any marking whatever except two minute white dots, which would have been the pupils of the two black spots, had they existed; the entire upperside of the hindwings, with this exception, being of a blackish olive-brown. The colour of the underside of the hindwings in this specimen is hardly affected, but that of the forewings is an unusual shade of tawny olive-brown."
 - o. Mr. R. Adkin records, 1905, "Proc. S. Lond.," p. 94, a specimen with the pale rings on hindwings absent, the ground colour intensified and somewhat less prominent pale marking.

5. Geographical Races.

- a. (?) *xiphia*, Fab. Madeira.
- b. *meone*, Cram. Algeria.
- c. *cyerides*, Stgr. Central and North Europe.
- d. *xiphioides*, Stgr. Canary Isles.
- e. *camena*, Fruh. Tyrol.

- f. egestas*, Fruh. Dalmatia.
- g. sidda*, Verity. Sardinia.
- h. italica*, Verity. Florence and Italy.
- i. (?) cashmirensis*, Bing. W. Himalayas.

VIII. QUESTIONS FOR FURTHER INVESTIGATION..

1. The position of the *xiphia* of Fabricius.
2. The figures of *xiphia* in Herrich-Schäffer.
3. The position of the *meone* of Cramer.
4. Where does Esper's *meone* come ?
5. What is *xiphioides*, Stdgr. ?
7. Is Wagner's figure of *meone*, "Reis. Alg.," vol. iii., pl. ix., 1841, the nearest approach to Linnæus' *ageria* ?
8. What is Boisduval's figure of *xiphia*, "Icones," vol. i., pl. 44, figs. 6 and 7 ?
9. The elucidation of Hübner's figures 179, 180, 181, 182.
10. Are there parallel races not repeated broods in the year ?

Mr. Gibbs exhibited a case containing a series of different forms of *Pararge aegeria* from widespread localities, including var. *egerides*, from England, Seine-et-Marne, Vosges, and Swiss Jura ; the eight-spotted Balkan form from Montenegro, which Cosmovici has named var. *alba* ; a specimen from Salonica which more nearly approaches typical *ageria* ; intermediates from the Riviera ; the ordinary southern form from eastern Pyrenees, Corsica, Sicily, Cyprus, and Algeria ; the true *meone*, Cr., from Morocco ; and var. *xiphioides* from Teneriffe. He expressed the opinion that modern authorities were correct in holding that Linnæus had bestowed the name *ageria* upon the southern form ; the definite statement as to the locality from which the specimens he was describing came, and the colour-adjective he used, were strong evidence that this was so. He thought, however, that Staudinger's name for the northern form, *egerides*, must fall before the earlier appellation *tircis* used by the French authors for this butterfly. So far as he was aware the name *tircis* was first printed by Geoffroy in 1764, but he gave no figure, and the description did not help much. It must be remembered that but six years had elapsed since Linnæus bestowed the name *ageria* on the species, and the difference between its two forms was probably not then recognised. But in 1779 Ernst and Engrmelle published their "Insectes d'Europe," and in it they figured and described the northern form under the name of *tircis*. J. B.

Godart, in 1821, did the same thing, but he also dealt with the southern form separately, under the name of *meone*. Mr. Gibbs therefore expressed the opinion that the proper name for our British variety of *ageria* was *tircis*, and that the authorship of the name must be ascribed to Ernst and Engramelle. The insect called *meone* by Cramer was the very red form, which flew in Algeria, Morocco, and Gibraltar. Cramer's original drawing was at South Kensington, and that, in conjunction with the fact that Cramer's specimen was known to be from the Barbary coast, disposed of all doubt. The name *meone* was wrongly applied by subsequent authors to the South European form. Esper created confusion by quoting Cramer's description, but making *meone*, Cr., a synonym of *xiphia*, Fab., a totally distinct insect. Hübner made matters worse, first by applying the name *meone* to the South European form and also by perpetuating Esper's mistake of supposing *meone* and *xiphia* to be the same thing. And so it came about that our North European form was called *ageria* and the southern darker spotted form *meone*, both of which names were wrongly applied, and it was only in comparatively recent years that the mistakes were found out.

Mr. Gibbs also exhibited a smaller case of Devonshire specimens, including a number taken by Dr. R. C. L. Perkins and himself in April and May, 1916, and a short series of the summer brood captured by Dr. Perkins in 1911. He remarked that in some seasons that gentleman had taken the insect as early as March 20th. He was pleased to say that Dr. Perkins was conducting some rearing experiments which would probably yield valuable results.

Mr. Platt-Barrett exhibited specimens from various localities, British and continental, and contributed the following note:—

“ I first captured this species in Yorkshire, at Doncaster, on April 19th, 1856, and I have never seen it so abundant since.

“ When I came to London, soon after that, I was told it was a common species in woods and shady lanes (suburbs of London excepted). It had disappeared from Peckham Rye and other suburban localities within the memory of active entomologists. This disappearance has gradually increased over a greater area.

“ Outside the London area—the ‘ Wood Argus ’ as I called it—always appeared as a pleasant surprise. I met with it at Ashted under the oak trees, near Headley under the beech, and near Dorking under the pines, but only in small numbers. Also at Loughton, when I went for *Erastria venustula*, at Darenth also and other Kentish woods, the best locality being between Eynesford and Shoreham.

"Around London, since the year 1900, I have not taken many specimens. These I exhibit are all taken by myself. New Forest (1906), Shoreham (1908), Porlock (1910), Sidmouth (1911), and one stray specimen, Chattenden (1913). I have searched for the last three years near London without success, but I hope to be more fortunate in my dates next year."

Dr. Chapman showed three specimens of *Pararge xiphia* from Teneriffe, a dozen *P. ægeria* from the Riviera (Alassio, Cannes, Hyères), three Devonshire specimens, one poor specimen from the Pyrénées Orientales, better and more extreme specimens had been given away, but even this one showed that specimens from this locality, Vernet, and especially Amelie-les-Bains, give to an English eye the impression rather of *megea* than of *ægeria*.

Mr. Leeds exhibited five specimens taken August 1911, var. *egerides*; three specimens, also August 1911, resembling *ægeria* as obtained in the southern countries of Europe. All taken wild in Cornwall by Mr. D. Hann, of Knebworth.

Two specimens, Hunts, June 22nd, 1904, var. *egerides*. On this date there were thousands in Bevill's Wood, but worn. He had not seen it there since, although he had frequently visited the locality every year. Also five specimens taken in South Devon, July 24th, 26th, and 31st, and August 4th, 1916, var. *egerides*, where it was only seen occasionally in woods or lanes.

Messrs. Curwen and Hy. J. Turner also exhibited the species from many localities.

It was generally the opinion that the species was by no means a denizen of the woods, but was quite as frequently met with along hedge-rows in lanes, and even in open fields.

SEPTEMBER 28th, 1916.

Mr. T. W. Hall exhibited a larva of *Cossus ligniperda*, sent to him by a friend, and called attention to the habit it had, when annoyed, of emitting a dark brown evil smelling liquid, apparently out of its mouth, ejecting it for a distance of quite three or four inches.

Dr. Chapman called attention to the figure of Röseler in "Insect Belust.," 1740-6, vol. i., pl. xviii., in which a larva is shown shooting out a liquid from its mouth.

Mr. Bunnett exhibited a piece of wood having a large number of the beautiful sporangia of the Mycetozoa, *Physarum compactum*.

Mr. Newman exhibited an aberration of *Agriades thetis*, of which several had been taken by him in Kent during the past season. The specimen was a male, in which the whole of the wings were suffused with a dark leaden colour. It was probably the rare form known as ab. *nigra*. Mr. Newman said that he only knew of a few of such aberrations having been taken in this country.

Dr. Chapman exhibited considerable series of grasshoppers, taken by him on the southern slopes of the North Downs, east and west of Box Hill, and contributed the following note:—

"A few years ago I sent Mr. Lucas some grasshoppers from Buckland Hill, two of which he (Mr. Lucas) said were in his experience rather scarce, and he should like to see some more. The opportunity to go into the matter occurred this autumn, with the result that one of these species, *Stenobothrus lineatus*, was found to occur wherever sought for on the slopes of the North Downs, between Reigate Hill and Pickett's Hole, most abundantly along the lower part of the drive in the Denbies estate, more sparingly elsewhere. The other species *Gomphocerus rufus* seemed to be absent in places, it occurred on Colley Hill and was most abundant on the slope above Pickett's Hole. It seemed to be absent (certainly very rare) on Box Hill, where *Gomphocerus maculatus*, a very pretty little grasshopper when alive, was very abundant, but though a very common species was not seen on any other part of the slope examined. *G. rufus*, and less markedly *S. lineatus*, were most abundant in places where *Agriades thetis* (*bellaryns*) occurred, i.e., where *Hippocrepis* grew. This may have some meaning or may be mere coincidence. At the beginning of September nearly all *S. lineatus* were mature at Dorking, but a few days later (September 7th) barely a majority had reached the imago state on Colley Hill.

"I exhibit specimens of these and of *Chorthippus parallelus* and *Stauroderus bicolor*, two species that were not uncommon in the same localities. It is worth noting again, as something having a reason behind it that I have not discovered, that *Gomphocerus maculatus* occurs abundantly only on the one portion of the slopes examined, from which *G. rufus* appeared to be absent, but was not found elsewhere, that the two species appear to be, in fact, on these slopes, mutually exclusive."

In reference to *G. rufus*, Mr. Lucas said that as a rule he had found it among grass in much damper situations than that in which it occurred in Dr. Chapman's experience.

OCTOBER 7th, 1916.

FUNGUS FORAY.

Leader.—W. J. LUCAS, B.A., F.E.S.,

Mr. Lucas reports.—“On October 7th, the last excursion of the season, the Fungus Foray, took place, the hunting-ground being Oxshott Heath and Esher Common. The day was not an ideal one as regards weather, though the little rain that fell was not sufficient to interfere with proceedings. This, however, may have had something to do with the fact that but six members (Messrs. Sich, Turner, Kaye, Gibb, Ashdown, Lucas) and one visitor were present. The Selborne Society and the Wimbledon Natural History Society, we found, were present on the same quest as ourselves. They were under the leadership of Dr. Somerville Hastings, Mr. A. A. Pearson, and Miss E. M. Wakefield, and, as some of their party were known to us, we decided to join forces. Consequently about 40 naturalists were piloted through the pine-woods by the various leaders.

“Specially interesting is the fungus-flora of the pine-woods, if only from the fact that many species will grow in such a habitat and nowhere else. Of course *Sparassis crispa* of which our Society has previously found on its forays such fine examples, received marked attention. Several clumps, which were not inaptly compared to the inside of a cauliflower, were met with on this occasion, and an attempt was made to trace the “stem” of one down to the roots of a Scotch-fir, near one of which trees the species seems always to grow. Dr. Hastings considers that the fungus kills the trees, and was locating examples for further observation. *Russula emetica*, with its vivid red cap, was met with everywhere on the ground, as were many other species, some brilliant in colour, others more soberly clad. The strange little yellowish fungus, *Leotia lubrica*, was found in one spot, and the gelatinous hydnum, known as *Tremellodon gelatinosum*, on several stumps; but what seemed to interest the party most was the discovery of a bed of a small black club-shaped fungus about an inch or so high, called *Cordyceps ophioglossoides*. This fungus peeps up amongst the fir-needles, and, when dug-out, is found to be parasitic on the false truffle, *Elaphomyces granulatus*, a fungus about the size and consistency of a chestnut. The presence of these underground truffles would scarce be detected if it were not for the presence above ground of the sporophores of the parasite. Many of the truffles were brought to light, not all of course being parasitised. Judging by the fact that

one often sees small holes scratched in the earth, it would appear that some small animals, perhaps squirrels, are able to detect the presence of the truffles. One or two only of the many fungi found are here referred to. Some interesting species of those strange "plant-animals," the mycetozoa, were met with, but on them I am not able to report. As darkness came on our small party made its way to Oxshott and had tea together before making towards home.

"Mr. Turner who was the sole representative of the morning party spent his time collecting the genus *Perônea* along the hedges of the path leading from the "covers" to Abrook Common. A varied series of *Teras contaminana* was obtained, and a few late examples of other species."

OCTOBER 12th, 1916.

Mr. W. J. Kaye exhibited a specimen of the new species of *Ornithoptera* recently figured and described in the "Ann. and Mag. of N. Hist.," 1915, p. 59, pls. iv. and v., as *O. joiceyi*. It was from New Guinea.

Mr. L. W. Newman exhibited several specimens of the extreme melanic form of *Boarmia consonaria* from East Kent; examples of a fine melanic form of *B. consortaria* from Warwickshire, very much darker than any form known from other localities, together with an interesting intermediate specimen; a good series of full sized var. *rossica* of *Callimorpha dominula* from Kent; and a bred series of *Dicranura bicuspis* from Tilgate Forest.

Mr. A. E. Gibbs exhibited a case of further specimens of *Pararge ægeria* var. *egerides* from S. Devon, and read the following notes:—

"It will be remembered that at a recent meeting I exhibited a number of specimens of the spring brood of var. *egerides* captured by Dr. Perkins and myself at Paignton. I drew your attention to the fact that Dr. Perkins was conducting some rearing experiments and gave you an idea of the direction in which his observations were leading. I have now received some most interesting memoranda from him which I should like to lay before the Society. When I was in South Devon at the end of April and the beginning of May freshly-emerged females were fairly common, but females appear to have been less in evidence later on. The comparatively few captured by Dr. Perkins in May and up to the middle of June (excepting one or two, evidently virgins, freshly-hatched specimens)

were all kept alive in cages for eggs. Large numbers of ova were laid by these from the latter part of May till the end of June. The resulting larvæ were fed on growing luxuriant food under natural conditions of temperature. The rate of growth was very slow, and it was not until the 29th of July (though possibly overlooked on the 28th) that the first butterfly, a ♀, emerged.

"On the same day the first second-brood wild female was observed in the lane whence the stock had been procured. These two specimens I am exhibiting this evening.

"From the latter part of June till July 29th, the butterfly in a wild state had become very scarce, though throughout May and till the middle of June it was extremely common in the lanes. Except perhaps a few worn examples it disappeared in July, and in 1916 it may be said that the second brood did not begin to emerge till the end of that month.

"By the end of July and in early August Dr. Perkins had hundreds of larvæ varying in size from those full grown or nearly so to those still very small, or about in the second and third stages. A few butterflies emerged from August 10th to August 17th, from May or early June eggs, but on August 10th most of them were still in the larval stage and many not more than half grown, some smaller still. On August 9th several pupated. Three butterflies emerged from these pupæ on October 1st to 3rd. One of them was a cripple, but the other two which are rather small and peculiar specimens are in the case, these were bred indoors. The pupæ are dimorphic, a beautiful clear green or brown.

"On September 12th and following days the butterfly was found in great numbers in some of the lanes behind Paignton, many of the specimens being very fresh and perfect. About the same date some of both sexes were bred from early August pupæ. Some of the males are exhibited to-night, but the females were put in cages and wild males with them to obtain fertile eggs. Ova were laid by these females till the end of the month but many of them were destroyed by predaceous insects or bad weather, the last butterfly dying about October 1st, after exposure to several nights of violent rains. The first caterpillar emerged from these eggs on October 5th, and half a dozen or more on the following morning.

"On the 3rd of October the grass on which the eggs were laid was dug up, potted, and placed in the open window of a loft.

"The conclusions at which Dr. Perkins has arrived from his observations and experiments during the present year are exceed-

ingly instructive. No very early (March) specimens such as occur some years were seen in 1916, but the first brood of *eyerides* appeared without any break or diminution of numbers from early spring till the middle of June. There is little doubt that all of these belonged to one brood derived from eggs laid the previous year. A distinct gap was then observed in the occurrence of the butterfly and it was not until the end of July that fresh specimens appeared. The fact that many of the eggs laid in the latter part of May and beginning of June did not become butterflies till September 12th to October 3rd, while hundreds of larvæ less advanced than these and only half grown in the second and 3rd week in August were thrown away for want of facilities for rearing them, renders the idea of a 3rd brood in 1916 impossible. It seems unlikely that most of these larvæ could possibly have produced any butterflies till next year. It would appear then that in 1916 so far from being three-brooded *eyerides* has been probably only partially double brooded, for it is extremely unlikely that the latest laid eggs of the first brood have yet produced butterflies, or that they will do so. It is to be presumed that the young larvæ, from the eggs of the first brood, which were flung out about August 15th to 20th, would have hibernated as larvæ or pupæ, or some in one stage and some in the other. The continuous succession of perfectly freshly hatched butterflies from early spring till the middle of June would indicate the hibernation of individual larvæ of very different growths, or of larvæ and pupæ. It appears to be extremely likely from these 1916 observations that *eyerides* sometimes takes the full year, or about that time, from egg to imago.

"Dr. Perkins draws my attention to another interesting point which I should like to mention. It appears to be the case that while the 2nd brood males are normally and on the average darker than the first brood, it is the reverse with the females, which are on the whole brighter in the second brood.

"These experiments by Dr. Perkins are exceedingly useful and we are very thankful to him for undertaking them and for giving us the results of his work. They go a long way towards clearing up many obscure points in the life-history of this butterfly, in the south-western districts of our island, and we look forward with much interest to his further observations on the brood which will result from the late summer and autumn laid eggs, some of which are now hatching out."

In the discussion which ensued it was shown that the larva

could hibernate at almost any stage from quite young to almost full grown, and that hibernation also took place in the pupal stage. Mr. Newman stated that he saw no spring specimens in 1916 but that from a female obtained in June he had ova which produced imagines in September, not one remaining over.

Mr. W. J. Kaye read the report of the Field Meeting held at Ockham and Wisley on May 20th (see page 61).

Mr. Hy. J. Turner read the reports of the Field Meeting held at Clandon on June 24th (see page 71), and of the Field Meeting held at Box Hill on July 22nd (see page 78).

Mr. Sich reported that the balsam *Impatiens parviflora* occurred wild in the neighbourhood of Chiswick, and also that he had recently met with a larva of *Mamestra oleracea* feeding on ivy in the Temple Gardens.

Mr. F. W. Frobawk exhibited a ♀ *Celastrina argiolus* in which there were several small streaks of ♂ coloration running through the wide marginal band on the left forewing, and also an underside of another specimen of the same species in which there was a streak of black of irregular width extending from the base of the wing across the centre to the hind margin near the anal angle of the hindwing. He also showed a specimen of *Argynnis cydippe* (*adippe*) from an old collection, in which the black markings on the upper-side were united across the disc of the wings to form a narrow irregular transverse band. The specimen was large, the ground colour dark and rich and the underside was quite normal.

Mr. A. E. Gibbs exhibited a number of purse-like galls on the petiole of the leaves of poplar, *Populus nigra* v. *pyramidalis*. They were ascertained to be caused by the Aphid, *Pemphigus bursarius*. He pointed out the illustration of a similar species in the recent "Report of the Entomological Society of Ontario" in a plate reproduced from Malpighi's "De Gallis," 1686, and communicated the following note:—

"GALLS OF PEMPHIGUS BURSARIUS, ROCH.—In the garden of Bricket House Hospital, St. Albans, are some Lombardy Poplars growing close to the fence. Passing by them one day in July after a gale of wind I noticed some of the leaves which had been blown off had curious swellings on their petioles. Examination showed that they were galls caused by insect puncture. My attention having been arrested by these stray leaves, I looked at the tree more closely and observed that a very large number of the leaves had been similarly attacked. I took one of the galls home and in

a short time bred from it a number of aphides. Other galls which I cut open contained nymphs. The history of the gall is this: the queen aphid punctures the cuticle of the leaf stalk which causes the sap to exude and to form a swelling, which gradually increases in bulk and encloses the queen aphid, leaving only a small aperture at the apex of the gall. In this cavity the queen brings forth a numerous brood of nymphs, which, when they arrive at the winged state, make their exit through the opening at the top of the gall. The shape of these galls is very variable, but the majority of those I picked up were roughly pyriform. Among the specimens I show will be seen a petiole on which there are two galls, one above the other. An illustration of the galls may be found in the late Mr. Edward Connold's "British Vegetable Galls," p. 239, etc., pl. 104, (1901)."

Mr. Gibbs also showed a new species of the *Syntomidae* and communicated the following description:—

"I also exhibit a moth which is new to science. It was sent home by my collector Norton and was taken by him in the mountains of Guatemala in December last, at a place called San Cristobol, where the poor fellow died suddenly a few weeks back, and the sad news of his death has just reached me. It is a *Chlorostola*, and its nearest relative is *C. coridon*, from which it differs chiefly in the orange-red colour of the terminal segments of the abdomen. I propose to call it *Chlorostola phyllis*, n. sp."

Mr. Dennis exhibited a photograph of the species of Dodder, *Cuscuta europaea*, parasitical on clover. Mr. Turner reported that the morning party at the Westerham Field Meeting in September met with large masses of the species *C. epithymum* on wild thyme, and that when trodden upon and bruised there was a distinctive scent.

OCTOBER 26th, 1916.

The death of a member, Mr. C. A. Briggs, F.E.S., of Lynmouth, was announced with regret. He was a constant attendant at the meetings a quarter of a century ago.

Mr. Bowman exhibited examples of *Aricia medon* (*astrarehe*) in one of which the discal spots on the underside lower wings are missing and are replaced by white splashes. Another example was a pure var. *obsoleta* in which all the spots on the underside were

absent except the discoidal in each wing. All four wings were heavily striated with white.

Mr. Brooks exhibited specimens of the introduced floating water-plant *Azolla caroliniana* from Enfield. Some years ago it was reported as being found in ponds in the neighbourhood of Chigwell. It is a *Rhizocarp* not far removed from the *Marsiliaceæ*.

Mr. Hugh Main exhibited a stereoscopic picture of the stag-beetle, *Lucanus cervus*, taken shortly after pupation.

Mr. Frohawk exhibited drawings by himself of two remarkable aberrations of British birds; a specimen of the Curlew from Caithness in which the markings were both strongly melanic and strongly albinistic, and an example of the Lapwing which was pure white with the exception of the breast. It was noted that although lapwings were extremely abundant, very little aberration of marking had been noticed.

Mr. Hy. J. Turner exhibited a collection of specimens arranged to show the genus *Pararge* in its most extended sense, and in the same order as they are placed in the National Collection, to illustrate his paper, "The Genus *Pararge*, Hüb.," which he then read. (See page 7).

Mr. Frohawk reported that he had just received a letter from Ireland announcing that on October the 20th a specimen of *Anosia plexippus* had been captured in Co. Cork. So far as he knew this was the first Irish specimen of this species. There were now he believed some 30 British specimens of which nine had been met with in Cornwall. In answer to a question as to its flight by night, Mr. Frohawk said that there was no direct evidence of it, but that it must do so, as to cross the Atlantic in a day was quite impossible. He noted that many species flew by night in their migration, and specimens had been seen to float on the water and even to rise from it to continue their flight. The stages of the species were so extremely short that neither ovum, larva nor pupa could be brought over, nor was there the special food-plant available to sustain the larva.

Mr. Curwen asked the opinion of members as to whether they considered this migration to be voluntary or a matter of compulsion from the force of the wind. Some years ago he had noticed *Pyrameis cardui* in some numbers strenuously endeavouring to stand against the wind, which was blowing strongly from the low cliffs, apparently not wanting to go but compelled to by the wind force.

Mr. Frohawk said that in calm weather many observations had been made of these migrations, which appeared to be quite voluntary, and he instanced a case in Switzerland in which for hours individuals of a species had been noted as passing a particular spot, all flying definitely in the same direction every minute or two.

Mr. Turner recalled the remark of the late Mr. McArthur that one of the best opportunities, which occurred to him while collecting in the Himalayas, was to capture the swarms of butterflies which came up from the lower valleys against the wind blowing down from the mountain slopes.

Mr. Frohawk noted that a head-wind afforded excellent facility for birds to rise against the wind, and Mr. Brooks referred to the advice of old collectors at Wicken, that the sheet and light should be so arranged that the moths would come up against the wind.

Mr. Leeds and Mr. Adkin had seen migrations come in from the sea in quite calm weather, and Mr. Adkin said that the method of flight of the insects he had observed on migration quite gave him the impression that it was a voluntary matter. He referred to the case of quantities of *Plusia gamma* going up straight into the air from a wheat-field, completely out of sight.

NOVEMBER 9th, 1916.

Mr. G. W. Mason of Ealing was elected a member.

Professor Bateson, F.R.S., gave a lecture with lantern and other illustrations entitled, "Remarks on the Mendelian Theories, with especial reference to recent extensions in their application made in America." Some discussion subsequently took place.

Mr. G. T. Porritt exhibited a gynandromorph specimen of *Lasiocampa quercus* and an olive-banded male of the same species, both from the moors near Huddersfield. Also a lemon-yellow male of *Cosmotriche potatoria* from Cambridgeshire.

Mr. J. Platt-Barrett exhibited a considerable number of *Lycanida* taken by himself this season, and contributed the following notes on his exhibit.

"This season I have seen seven species of *Lycanida* on the wing.

"1. *Celastrina argiolus*. Forest Hill as usual.

"2. *Polyommatus icarus*. Mid Kent, the end of May, one speci-

men exhibited, an intensely blue one. During the summer I only met with worn specimens.

"3. *Agriades thetis*. In Mid Kent, where in early June I paid a special visit, I caught one ♂ only, so went on to E. Kent where I could easily have reached my limit of 50 specimens. I show the best blue ♀s that I took, also a ♀ ab. *minor*, which occurs some years. Some of the females were large, and one ♂ was deformed on the left side. In September a ♀ was captured also deformed on the left side, and generally the females were small and without blue scaling.

"4. *Aricia medon* (*astrarche*). The spring brood only.

"5. *Cupido minimus*. July, then worn.

"6. *Plebeius agon*. In early August abundant at Oxshott. It varied in size, one ab. *minor* ♂ was taken. The undersides varied from grey to brown. A blue ♀ and several ab. *major* were taken.

"7. *Agriades coridon*. Tempted to Royston on August 12th, I first saw *Agriades coridon* literally in hundreds, and I no longer wonder that the specimens there vary so much. I wonder they have not turned cannibals to get sustenance and destroyed themselves entirely, and I should not be surprised to find that deformity follows overcrowding and that when the numbers decrease, ab. *roystonensis* will disappear. Near Tring on the 15th August after tramping a mile on Downs that barely produced a specimen of *A. coridon*, our small party discovered the metropolis, almost as crowded as Royston and I was lucky after the heavy rain had ceased to pick up a few blue examples and also some "deformities." One ♀ taken was almost the form ab. *fowleri*, and the undersides showed much variation in depth of ground colour."

NOVEMBER 23rd, 1916.

Mr. Edwards exhibited several seeds of vegetable ivory, and contributed the following note:—

"The plant yielding the 'vegetable ivory' of commerce is known to botanists as *Phytelephas macrocarpa*, a palm, a native of South America, chiefly on the banks of the river Magdalena, Columbia, not only, however, on the lower coast region as in Darien, but also at a considerable elevation above the sea. It is mostly found in separate groves, not mixed with other trees or shrubs, and where travellers tell us even herbs are rarely met with, 'the ground appear-

ing as if it had been swept.' It is a stemless or caulescent palm-like plant, the top of which is crowned with from 12 to 20 very long pinnatifid leaves. The plants are dioecious, the males forming higher, more erect, and robust trunks than the females. The fruit consists of a conglomerated head composed of six or seven drupes, and containing six to nine seeds, the whole being enclosed in a walled, woody covering, forming altogether a globular head as large as a man's. A single plant sometimes bears at the same time from six to eight of these large heads of fruit, each weighing from 20 to 25 lbs. They are imported into Britain under the name of 'Corozo' nuts, a name by which the fruits of some species of palm, *Attalea*, are known in Central America, their uses being chiefly for small articles of turnery."

Mr. West (Ashtead) exhibited a very beautiful specimen of fossil Madrepora.

Mr. L. W. Newman exhibited a fine series of very darkly marked specimens of *Agrionis aprilina*, from Teesdale.

Mr. F. W. Frohawk exhibited a bred series of *Chrysophanus rutilus* bred from ova, the race originating in Holland. He considered it the nearest approach to our now extinct *C. dispar*. The Austrian race was less like the latter and had less developed spots. He also exhibited a drawing of a very rare form of the Red Grouse (*Lagopus scoticus*) from Derbyshire. It was of an extreme silvery variety, of which only one or two previous examples had been recorded. This species varies extremely, but an albino of this degree was stated to be almost unique.

Mr. Hy. J. Turner exhibited a long and very varied series of *Peronea cristana*, including many named forms. Mr. Adkin remarked that although many names had been applied, it appeared to him that the variation fell into a series of more or less well defined groups, and the variation occurring in the groups was not sufficient in most cases to justify the bestowal of further varietal names.

Mr. Turner also exhibited examples of *Parnassius mnemosyne* from various continental localities, showing trivial and local variation. One female specimen showed the "pouch" formed below the abdomen after copulation.

Mr. Brooks reported that he had heard from Mr. B. S. Williams, who was at Blackpool, that recently the sea there had been extremely phosphorescent. He himself had seen two Martins at St. Margaret's Bay, on November 15th, which he considered was a very late date;

the latest dates he had previously known were November 9th and November 11th. He asked if the finding of imagines of *Acrionicta megacephala* on a poplar trunk, on the dates June 8th and August 8th, two months apart, indicated two broods.

In the discussion Mr. Adkin said that according to Eagle Clarke, November 16th was the latest recorded date for the Martin to be seen on migration in this country. Mr. West (Ashtead) said that phosphorescence was seen at times on most parts of our coast, and was due to the presence of a vast quantity of *Noctiluca*. It was not considered that *A. megacephala* had two broods in the season. Probably it was only a retarded emergence. Mr. Sich had seen a specimen in October some years ago.

Mr. Blair exhibited larvæ of the Dipteron *Microdon mutabilis*, which had been sent to him from the New Forest where it had been found among *Sphagnum*. It was usually a guest of ants and was supposed to act as a scavenger, subsisting upon the various *débris* in the ants' nests.

Mr. F. W. Frohawk reported a new habit he had this year noticed in the common wasp, that of collecting the ears of corn. He had found a portion of a field, 300 yds. by 12—14 yds., more or less completely ruined by this hitherto unrecorded habit. The nest in this case was some distance away, situated in a shed. If this habit grew and spread, formidable destruction of corn crops might ensue.

DECEMBER 14th, 1916.

THE ANNUAL EXHIBITION OF VARIETIES.

Mr. W. J. Kaye exhibited on behalf of Mr. J. J. Joicey:—

(1) A well-marked gynandromorph of *Papilio lycophron* var. *phanias*, R. and J., from North Peru.

(2) A pair of *Polygrapha cyanea*, Godm. and Salv. The ♂ is not rare in the tropical Andean region of South America, but the ♀ was unknown till the specimen here exhibited was taken in Ecuador by M. G. Palmer. A second specimen has not been recorded as far as we know. This female is remarkable in presenting a strong resemblance to certain species of *Opsiphanes*. These *Brasolid*s fly round the houses at dusk, and as the female *Polygrapha* was found drowned in a native water-pot outside a house, it is possible that it flew in company with the *Opsiphanes*.

(3) *Zygaena trifolii*, Esp., a yellow aberration, one of the original series taken by Mr. W. M. Christy in 1893, at Watergate.

(4) *Zygaena filipendula*, L., a yellow aberration taken by Mr. C. D. Head, at Tenby, 1897; an aberration with confluent spots on left forewings; an aberration intermediate between yellow and red; and a fine bred example of the aberration *chrysanthemi*, much darker than usual.

(5) A new phase of variation illustrated by twelve new forms of *Heliconius melpomene* from French Guiana, taken between the two places, St. Jean and St. Laurent, on the Maroni river. These were named *primus*, J. & K., *collis*, J. & K., *melpina*, J. & K., *negroida*, J. & K., *maris*, J. & K., *faustalia*, J. & K., *elegantula*, J. & K., *eltringhami*, J. & K., *punctarius*, J. & K., *majestica*, J. & K., *lucindella*, J. & K., and *stygianus*, J. & K. The most remarkable among these were *primus*, *maris*, and *punctarius*, which collectively represented a wholly new phase of variation in *melpomene*, with a conspicuous yellow spot within the cell. In describing all these new forms it was pointed out that the end kept in view was that, as the *melpomene* forms divide up according as to whether they have a hindwing with either (1) a black, (2) a red base, (3), a red base and flame-streaks, it was necessary to describe each phase of the forewing in each category of the hindwing as soon as it was known to occur. In many instances this repetition is known to occur, but in some few cases up till now the links are missing. For instance, there is no known pure black *melpomene*. Yet it seems possible that some day it may occur, for forms occur with all the discal forewing colouring absent, and *melpomene* itself has of course a black hindwing, but till now absence of discal forewing colouring is only known when the base of the forewing is red, when also at the same time the hindwing is either red at base or flame-streaked in addition. Most of the forms named above were to be figured on a plate to appear in the "Transactions of the Entomological Society of London." (1916, p. 412, pts. cvii, cviii.)

Mr. W. J. Kaye himself exhibited a large cabinet drawer containing practically all the species of the Ithomiine genus, *Lencothyris*. The genus was characteristically composed of transparent insects with black markings, and a recurring feature was a black belt across the cell of the forewing. Although the majority of the species were thus coloured there was a small group that had developed a varying amount of orange marking on the forewing. These species were doubtless mimics of other Ithomiines, or species of other families.

The different species were found from sea level up to 10,000 feet, at which elevation the largest species, *L. orestilla*, was found. *Leucothyris zelica* was undoubtedly a mimic of Pierines of the genus *Dismorphia*, and not a model as might at first sight be supposed. Haensch considered that the species composing the genus could be split up, but while there are minor structural differences, such as a longer, or a shorter hindwing cell, the genus seemed a very natural one. The peculiarly oblique position of vein 5 of the hindwing usually revealed a *Leucothyris* at a glance.

Dr. Cockayne exhibited an aberration of *Polygonia (Grapta) c-album*, taken in Montgomeryshire, September 7th, 1916, by Lord Garioch. The two large costal spots on forewing united into a semicircular black patch, and the hindwings are almost entirely suffused with black.

Dr. T. A. Chapman exhibited examples, males and females, of two pairs of closely related Lycænid species, one species of each pair having only been differentiated in recent years, viz., *Callophrys rubi* and *C. aris*, from the French Riviera, and *Lattiorina orbitulus* var. *oberthüri* and *L. pyrenaica* from the Pyrenees. He also showed the double-brooded South European *Agriades*, which Dr. Verity distinguishes from *A. coridon* as a new species, under the name of *aragonensis*. Its life-cycle is that of *thetis*, with two broods, not of *coridon*, which is single-brooded. The appendages of *coridon* and *aragonensis* are indistinguishable.

Mr. Leeds exhibited the following aberrations of British Lepidoptera, taken in 1916:—

Polyommatus icarus. 1. ♂. Short streaks instead of black dots on forewings. Underside. Herts, August 25th, 1916.

2. ♀. ab. *carnea* of very pale blue ground. Upperside. Hunts, June 3rd, 1916.

3. ♀. Brilliant blue, with blotches of inner margin pinkish-scarlet. Upperside. Hunts, June 3rd, 1916.

4. ♀. Very dark bluish-brown ground, blotches of inner margins of hindwings reddish-brown. Upperside. Hunts, June 3rd, 1916.

5. ♀. No orange markings, ground-colour bluish-brown. Upperside. Hunts. June 9th, 1916.

Ctenonympha pamphilus. 1. ♀. Forewings with straw-coloured suffusion. Upperside. Herts, June 7th, 1916.

2. ♂. Large, with dark fulvous ground colour. Upperside. Herts, May 23rd, 1916.

Bithys (Thecla) quercus. 1. ♀. Type for comparison. Upperside. Devon, July 24th, 1916.

2. ♀. Dark blue instead of purple patches. Upperside. Devon, August 2nd, 1916.

Agriades coridon. 1. ♂. Considerable blackish suffusion. Upperside. August 26th, 1916.

2. ♂. Marginal spots of hindwings ringed with orange instead of white. Upperside. Herts, August 12th, 1916.

3. ♀. Very dark ground, several small blue spots on hind wings. Upperside. Herts, August 26th, 1916.

4. ♀. Pale buff ground. Upperside. Herts, August 26th, 1916.

5. ♀. Within inner margins nervures separated by pale wedges on forewings and whitish-blue on hindwings, latter contrasting sharply with a dark blue suffusion of wings. Upperside. Herts, August 26th, 1916.

6. ♀. Central area blue on all wings, hindwings with pretty border of white and red rings to black spots, and interior pale blue small wedges. Upperside. Herts, August 17th, 1916.

7. ♀. Black markings of forewings elongated and very large, also additional small black dots. Underside. Herts, August 26th, 1916.

8. ♀. Spots very large and irregularly shaped, also many extra spots on forewings, ground colour of all wings dark. Underside. August 26th, 1916.

9. ♀. With ab. *parisiensis* markings on each forewing. Underside. Herts, August 26th, 1916.

10. ♀. A very dark ground, and ocellated spots large. Underside. Herts, August 26th, 1916.

11. ♀. Hindwings with small pale streaks instead of ocellated spots, latter quite obsolete, central spot large and pure white. Underside. Kent, September 9th, 1916.

Epinephele jurtina (janira). 1. ♂. Central area of each hindwing bleached. Upperside. Devon, August 1st, 1916.

Epinephele tithonus. 1. ♂. On forewings two small black spots placed slightly apart, instead of one, only one spot has white centre, and this is very minute. Upperside. Devon, July 27th, 1916.

2. ♂. Two extra ocellated spots on forewings, and all wings considerably bleached. Upperside. Devon, August 1st, 1916.

3. ♂. All wings with three spots. Upperside. Devon, August 5th, 1916.

4. ♀. Extra spot, and straw-coloured streak on each forewing. Upperside. Devon, August 5th, 1916.

5. ♂. Complete absence of black spot from each forewing. Underside. Herts, August 20th, 1916.

6. ♀. Two very large additional ocellated spots on each forewing. Upperside. Devon, August 5th, 1916.

7. ♀. *Ab. mincki* (yellow) with an extra black dot on each forewing. Underside. Devon, August 3rd, 1916.

8. ♀. Small black streak beneath usual spot on each forewing, ground colour ochreous, borders pale. Underside. Devon, August 1st, 1916.

Mr. L. W. Newman, on behalf of Mr. Percy Richards, exhibited a very fine collection of preserved larvæ of Macro-lepidoptera containing about half the British species. The larvæ after being blown were hand-painted by Mr. Richards, so that they appear in their natural colours.

On behalf of Mr. G. B. Oliver, of Wolverhampton, Mr. L. W. Newman exhibited a fine series of varieties of *Agriades thetis* (*adonis*), including a fine *ab. obsoleta*, two *ab. semi-obsoleta*, a very fine ♀ underside forewings *obsoleta*, and hindwings beautifully striated, and the whole of the ground colour creamy white, a ♂ underside of the snow-white ground colour, and other interesting undersides. A leaden coloured upperside ♂, a ♂ having the leaden colour and normal blue colour mixed, and a fine ♂ with ground colour about half way between normal and leaden.

A series of *Polyommatus icarus*, ♀s, showing considerable variation, a fine ♂ *ab. obsoleta*, large spotted and other forms, and

Canonympha pamphilus underside spotless, and one with extra spots.

On behalf of Signior Piazza, Mr. Newman exhibited a fine example of the *decoraria* (*subroseata*) form of *Zonosoma pendularia*, but having a white line behind the dark outer border between it and the red suffusion.

Mr. Newman's own exhibits were:—

1. A series of *Celerio gallii*, bred from North Cornish parents.

2. A series of hybrid *ocellatus* × *populi* showing considerable variation.

3. A long series of *Amorpha populi* aberrations from extremely pale to rich pink, and also some pretty mottled and some dark forms.

4. Unicolorous black specimens of *Eupithecia lariciata* from Warwickshire.

Mr. Newman also exhibited a series of a species of British Geometer new to science, and contributed the following note:—

“I am exhibiting what is believed to be a new species of Geometer, first discovered by the Rev. W. Metcalfe, in North Devon, nine years ago, and again found by the same gentleman in East Devon in 1914, and pronounced wrongly to be a small local form of *Lampropteryx suffumata*. It has also been found in 1914 at Bodmin, in Cornwall, by Mr. A. Bowen, in the same locality as *L. suffumata* and *Eustroma silaceata*, both of which species it resembles in some characters. All evidence, except genitalia, so far points to the fact that this is a new species.

“It is double-brooded, appearing in May and August, whereas *L. suffumata* in the same locality is single-brooded, it appears freshly out when *L. suffumata* is worn, and both fly in company in the same wood. It refuses all *Galium* as a food plant except *Galium saxatile*, which is obviously not its natural food, as the locality is a boggy wood and *L. suffumata* will freely feed on all species of *Galium*.

“The 1st and 2nd brood specimens are almost identical, and both when placed beside a series of *L. suffumata* are very distinct. The shape of the wings is entirely different, the new species having a very rounded forewing, whereas that of *L. suffumata* is pointed. The colour of the hindwings is duller and devoid of marking.

“It is hoped to work out the whole life-history in 1917, and publish the records, which will firmly establish this interesting insect as an addition to our British moths.”

In the remarks made on this very interesting exhibit, Mr. Mera said, “I am quite of opinion that this is not a form of *L. suffumata*, but is a distinct species which has been overlooked. Having discussed the subject with the Rev. J. W. Metcalfe of Ottery, St. Mary, Devon (who takes the species), he very kindly procured me a few ova during the early part of May, and as he had already tried them on the usual food plant for *L. suffumata* without success, I gave my larvæ a variety of choice, including the small willow-herb (*Epilobium parviflorum*?) and also *E. angustifolium* (I believe), and a spray of the small white bedstraw (*Galium saxatile*), which usually grows on open common land. This last named plant was the only one touched. I only succeeded in getting four larvæ to commence to feed, all of which I reared to the perfect state. They all emerged as a second brood in the beginning of August. These again paired and I obtained ova, but although I gave them the same food as before I could get none of the larvæ to feed. I think this failure

may have been due to some extent to the extremely lethargic nature of the young larvæ, which appear to keep to the spot on which they hatch, and there perish."

Several members considered that the food-plants mentioned so far were possibly only substitutes, and that the true food-plant had yet to be discovered.

The Rev. A. T. Stiff exhibited—

1. A series of aberrations of *Epinephela jurtina* (*janira*), including bipupillate specimens, females with yellow instead of orange round the apical spots, very pale females, females with extra spots on the undersides of the forewings, and a male with pale, indistinct bars on the hindwings. This last is a particularly interesting specimen, as the scales under the microscope show no sign of abortion or 'bleaching,' but the bars are apparently genuine pale bars such as are usual in the female, but generally hardly apparent in the male. All are from Folkestone or Tavistock.

2. A short series of *Arctia villica*, bred from Bentfleet larvæ, showing considerable variation.

3. A pale, semi-transparent *Hypocrita jacobææ*, bred from a Tavistock larva; comparing in colour with the rest of the brood as *Zygana purpuralis* does with *Z. trifolii*.

4. Three aberrations of *Cenonympha pamphilus*. (a) A very large female with black ocelli on the hindwings. Folkestone. (b) Female with double apical spot on the underside. (c) Male with minute, but perfect, apical spot on underside.

Mr. G. T. Porritt exhibited a very fine series of extreme forms of *Abraças grossulariata* ab. *nigrosparcata*, bred by himself from Huddersfield wild larvæ in 1916.

Mr. W. West (Greenwich) exhibited twelve drawers of the European butterflies presented to the Society by the widow of the late Mr. F. F. Freeman.

Mr. S. G. Castle Russell exhibited—

1. *Aphantopus hyperantus*. A series of varieties, including ab. *cæca*, ab. *arete*, and var. *lanceolata*, together with specimens with a number of rings on upper hindwing, varying from one to three. All the specimens with two exceptions were from North Hants. Mostly bred from ova.

2. *Agriades coridon*. A male specimen showing unusually rich colouring, Wilts; a male specimen showing unusually pale colouring with absence of black margins, Herts; and a typical bred specimen for comparison, Surrey.

3. *Saturnia pavonia*. A gynandromorph having head and antennæ male, body female, and one wing male.

4. *Deiopeia pulchella*. An example taken on the Surrey Downs, June 14th, 1913.

5. *Mimas tilia*. A specimen lacking the four spots on the upper wings.

Mr. A. A. W. Buckstone exhibited several series of *Selenia lunaria* originating from the Teesdale District.

A. Type forms (for comparison) bred from parent insect. Emergence, June.

B. Fourth generation bred in captivity. Emergence, April to June, 1916. A selected female of each generation was paired with a wild male.

C. Fifth generation. Inbred from two pairing of B. Emergence, October 4th to December 5th, 1916.

Failed in an attempt to force pupæ in summer, but fourteen moths emerged under natural conditions. There are 46 pupæ remaining over.

D. Dwarfed specimen bred from a full fed larva taken at Box Hill in September. Moth emerged in the following May.

He communicated the following note:—

“Both the type and a much darker form occur in the Teesdale district (on Yorkshire and Durham side). Some of the specimens shown at B and C would appear to approach *ab. sublunaria*.”

“It is usual for the pupæ of the second (summer) brood to remain green, but those which produced the moths which emerged October to December (C) were brown, as are those which have yet to emerge. The moths themselves are, speaking generally, considerably darker than the April-June specimens, instead of being lighter as those of the second (summer) brood almost invariably are. These two peculiarities, together with the fact that the moths commenced to emerge only after the pupæ had been subjected to frost, cause me to consider them rather as precocious members of the usual spring emergence.

“Specimens exhibited varied from greyish through various shades of brown to red-brown, thickly sprinkled with red scabs.”

Mr. Bowman exhibited a short series of *Zonosoma (Ephyra) pendularia*, and communicated the following notes:—

“1. Examples, in which the pink suffusion on the forewings is almost absent.

"2. Examples, in which the space between the inner and outer lines on the forewings is heavily suffused with pink.

"3. Examples, in which the white ground colour is absent, and instead all wings are completely suffused.

"4. Examples, in which the dots forming the inner and outer lines on both fore- and hindwings are elongated in such a manner as to give them the appearance of being striated forms.

"5. Examples of var. *nigro-subroseata*.

"The first example of this form I bred on April 27th, 1914, from a wild larva beaten in the autumn of 1913.

"By pairing this form with the typical form I have obtained, what I believe to be, an entirely new form of this insect. Whereas in the var. *nigro-subroseata* the space between the inner and outer lines on the forewings is pink, in this new form it is the same colour as the marginal bands, and therefore they may be described as being purple all over with the exception of the white inner and outer marginal lines.

"I am showing the only two examples I have of this form."

The Rev. J. E. Tarbat exhibited—1. A female *Agriades coridon* with no trace of orange marginal spots. 2. A male of the same species with the right lower wing malformed, another with the marginal spots of the hindwings coalescing, and an ab. *obsoleta*. 3. A *Mimas tilia* aberration asymmetrically marked, the right upper wing having the band divided into two spots, the left having only one portion of the band, that on the costa, present, and of less size than the corresponding portion on the right side.

Mr. Prideaux exhibited a series of aberrations of the female of *Polymmatas icarnus*, and an example of the ab. *schmidtii* form (yellow) of *Rumicia phleas*.

Mr. Stanley Edwards exhibited a number of species of exotic *Papilionida* and various species of the genus *Eurania*.

Mr. H. Moore, in support of his contention that the ab. *roystonensis* of *Agriades coridon* is a cripple and not worthy of a varietal name, exhibited a box of specimens of various species from different parts of the world showing a like deformity, and said probably most of them were due to a like cause, *i.e.*, a disease which arrested their full development, and that a term was wanted that applied to all similar cases wherever found. He also suggested that ♀s showing male coloration should be styled "gynandrous," that the possession of "androconia" did not necessarily indicate any alteration in sex, and

that only those having portions of their anatomy of the ♂ *shape* should be called gynandromorphic.

Mr. C. P. Pickett exhibited a drawer of representative specimens of *Angerona prunaria* showing results after interbreeding for 19 years, the last five years being devoted to colour. Those fed under yellow surroundings are all of a decided orange-yellow, many females approaching the males in coloration; those fed under green, the ground coloration being much paler, approaching more to whitish-yellow, quite a contrast to the orange-yellow forms. Those reared under red conditions are of a deep rich orange in the males and deep banded chocolate in the females, the chocolate predominating, the yellow in some cases being almost absent. Those reared under pink are certainly lighter in colour, the chocolate markings being broken up, and the yellow extending through to the edge of the wedge. The exhibit included a long series of ab. *pickettaria*. This form shows the chocolate bands very narrow and running across nearer the centre of the wings, the borders being quite yellow in the females and orange in the males.

Mr. Pickett also exhibited several drawers of *Agriades coridon* aberrations taken in the Herts district in 1916.

MALES.—UPPERSIDES:—Long series varying in colour from whitish-blue to almost *adonis* blue, containing ab. *fouleri*; many without the black borders; several ab. *marginata* with the black margin extending along the lower wings, giving them a striking appearance; one with lower wings of a lilac shade; several ab. *suffusa* and ab. *minor*; one with left side wings typical, right side upper wing ab. *suffusa*, and lower wing powdered black over the whole area; another with left side lower wing of a bleached whitish shade, the other wings being normal; one with right upper wing rounded same as lower wing with cilia extending around; one with only three normal wings, the left upper wing missing entirely (was captured flying).

UNDERSIDES:—Two perfect ab. *obsoleta*; three with extra large spotting; one with left side lower wing true ab. *obsoleta*, and the other wings typical; one of a white ground colour with hardly any trace of markings on border, the black dottings showing very conspicuously; three with very dark ground coloration approaching the female.

FEMALES.—UPPERSIDES:—Long series containing ab. *semi-syngrapha*; five almost ab. *syngrapha*; four with the whole of the wings black, showing no border markings; five with the upper wings

intense black with no markings on border, the hindwings showing blue spotting over the red lunules, a lovely striking form; two with white spotted borders, as in ab. *fowleri*; several with red bordering on all four wings; several with white-rayed borders extending from edge of wings to the central areas; ab. *minor*; four ab. *inaequalis* containing deep dashes of male coloration (gynandrous); three ab. *roystonensis* (gynandrous), the right side both upper and lower wings much smaller than the left, and well powdered with blue androconia.

UNDERSIDES:—One perfect ab. *obsoleta* with whitish ground colour; another ab. *obsoleta* with left wing without the usual border, the markings rayed into the central area, the right side unfortunately being crippled, otherwise it would have been a choice specimen; another true ab. *obsoleta* with the ground colour of a beautiful cinnamon-brown; two with right side lower wings perfect ab. *obsoleta*, other wings being typical; two ab. *striata* with deep black dashes in place of the usual spotting; many with ground colour of a blackish-brown; one of a very light ground colour (passable as a male); one with very dark borders, the central area being white.

Mr. Robert Adkin exhibited series of *Polyommatus icarus* from Scotland, including the Orkney Isles (representing its most northerly British range) and the Outer Hebrides, North and South Ireland, North Wales, the North and South of England, the Isle of Man, and the Scilly Isles. The series from the North of Ireland were remarkable for the large size of the individuals comprised in them, some of the males measuring 38mm. in expanse, and for the brilliant blue coloration and large size and intensity of the red submarginal spots of the females. Many of the Scotch specimens also were of large size, especially those from Orkney and the Hebrides, but the females were generally less brilliant except in the case of those from the last named locality, which closely approached the Irish. The South English series included many well-marked undersides, intensely blue and brown females, with many intermediates, and a couple of gynandromorphs taken respectively on Wandsworth Common, in 1860, and at Dover, in 1900.

JANUARY 11th, 1917.

Mr. West exhibited a spray of flowers which had just expanded from the buds sent to him from South Africa. Mr. Morton said

the plant was a Liliaceous one, known there as the "cape lily," and was very common.

Mr. Curwen exhibited examples of the various forms of the genus *Zygana* allied to the beautiful *Z. carniolica*. The series included the named forms, *Z. carniolica*, *Z. formosa*, *Z. hilaris*, *Z. occitanica*, *Z. lata*, and *Z. sedi*, considered to be forms of specific value, with ab. *berolinensis* and ab. *hedysari* of *Z. carniolica*, and ab. *albicans* of *Z. occitanica*.

Mr. Moore exhibited specimens of the deep green Sphingid *Euchloron megara* from South Africa, and a specimen of a large Phyllodine moth, *Miniodes discolor*. (See Kirby's "Hand. Lep.," vol. v., p. 168, plt. 142.)

Rev. F. M. B. Carr exhibited his captures of the past season in Staffordshire and at Wye on the Severn, together with a series of *Agriades coridon* forms and other captures from Royston. There were nice varied series of the early emergence of *Leptosia sinapis*, of *Breuthis selene*, *Agrotis segetum*, some very dark forms of *Acrionicta leporina*, examples of the intensely black form of *Xylophasia monoglypha*, a nice series of *Eulype hastata*, a row of *Venusia cambrica*, etc.

Mr. Hugh Main exhibited a cage made by him to facilitate the breeding of burrowing beetles of the genus *Geotrupes*, and at the same time to allow of full observation being made of the whole process of digging the galleries, massing the pabulum, laying the ova, feeding and growth of the larva, the act of pupation, etc., and read a paper entitled "On Rearing Beetles of the Genus *Geotrupes*," summing up his observations so far and criticising somewhat strongly previously published records of similar observations. (See page 18.)

It was suggested that possibly cages on the same lines might be suitable for observation of the life-history of some of the burrowing bees.

JANUARY 25th, 1917.

MR. HY. J. TURNER, F.E.S., PRESIDENT, IN THE CHAIR.

The meeting was devoted to the business of receiving and adopting the Report of the Council and the Treasurer's statement, and the announcement of the results of the election of Officers and Council for the ensuing year.

The President read his address. (See page 23.)

The following is a list of the members elected as Officers and Council of the Society for the Session 1917-18:—

President.—Hy. J. Turner, F.E.S.

Vice-Presidents.—R. Adkin, F.E.S., and A. E. Gibbs, F.L.S., F.E.S.

Treasurer.—T. W. Hall, F.E.S.

Librarian.—A. W. Dods.

Curator.—W. West (Greenwich).

Editor of Proceedings.—Hy. J. Turner, F.E.S.

Hon. Secretary.—Stanley Edwards, F.L.S., F.E.S., etc.

Council.—S. R. Ashby, F.E.S., W. J. Ashdown, K. G. Blair, B.Sc., F.E.S., G. Brooks, F. W. Frohawk, F.E.S., M.B.O.U., D. R. Morford, C. W. Sperring, A. E. Tonge, F.E.S., and W. West, L.D.S. (Ashtead).

Votes of thanks were accorded to the President, Treasurer, Officers, Council, and Auditors for their services during the past year.



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CORRIGENDA.

Page 16 line 33 for *magææ* read *megææ*.
 „ 37 „ 13 „ Shakespere read Shakspere.
 (Three out of the five actual signatures of the poet are so spelled.)
 „ 59 „ 16 „ *hyoscyania* read *hyoscyami*.
 „ 62 „ 7 „ *fluctuata* read *fluctuata*.
 „ 62 „ 22 „ *Rhyacinia* read *Rhyacionia*.
 „ 71 „ 35 „ *leacheana* read *lecheana*.
 „ 72 „ 23 „ *vulnerariæ* read *vulnerariæ*.
 „ 110 „ 25 and 27 for *melpomene* read *melpomene*.

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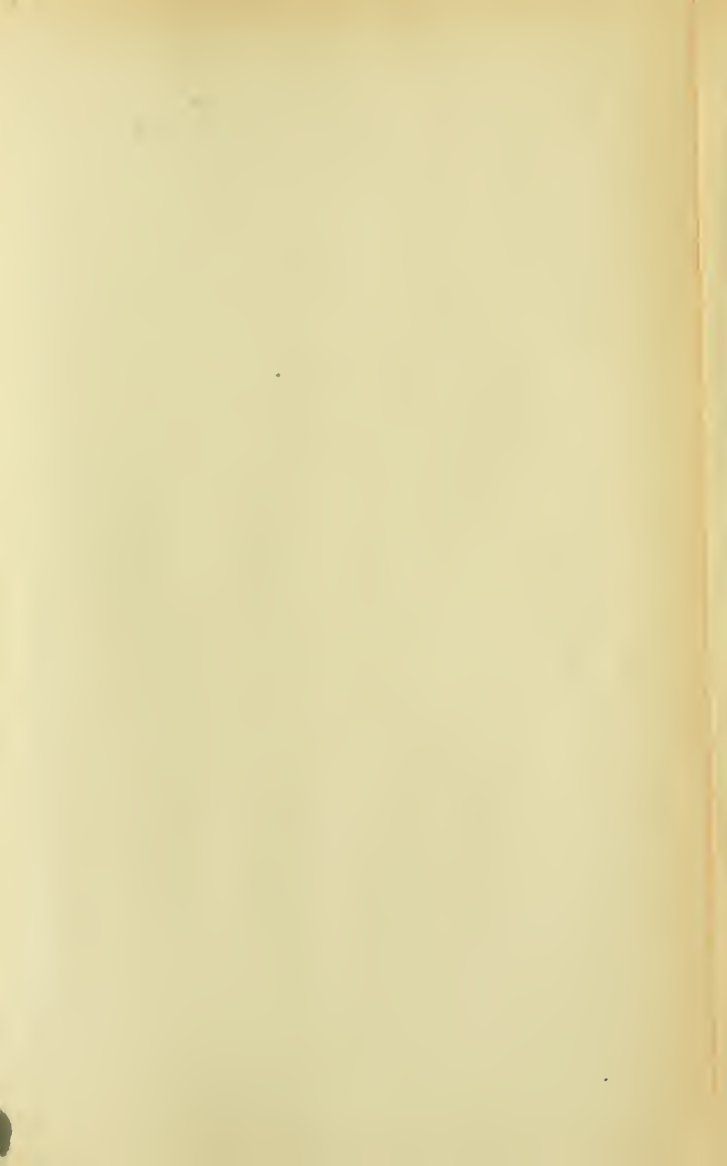
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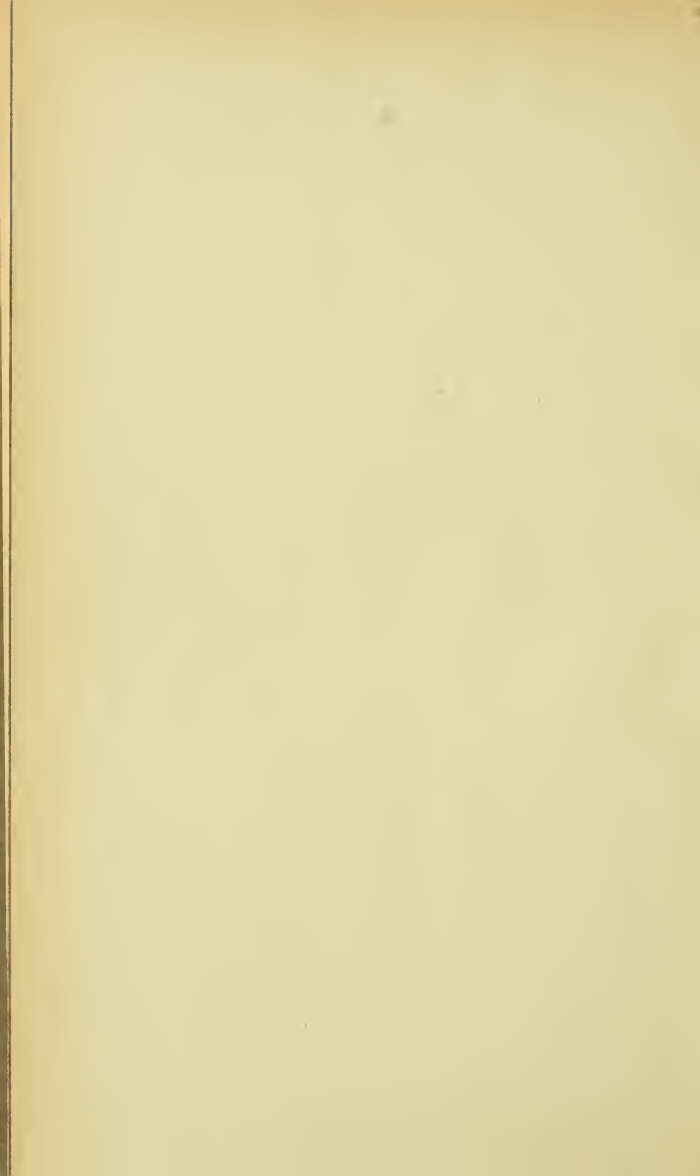
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